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COMMERCIAL FISHERIES REVIEW

A REVIEW OF DEVELOPMENTS AND NEWS OF THE FISHERY INDUSTRIES
PREPARED IN THE BRANCH OF COMMERCIAL FISHERIES

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SOME DATA ON pH AND FRESHNESS OF SHUCKED EASTERN OYSTERS

By S. R. Pottinger *

INTRODUCTION

Several years ago, various methods for determining the relative freshness of shucked Eastern oysters were investigated by Baldwin, Puncochar, and Pottinger (1941) at the Fishery Technological Laboratory, College Park, Md.

In addition to pH values, other measurements, such as changes in water soluble nitrogen, alcohol soluble nitrogen, and total titratable acids during storage of the oysters were made. Of these tests, the first seemed to be the most promising from the standpoint of rapidity and ease of manipulation, as well as reliability of results.

Data on the correlation of pH with oyster freshness had previously been published by other workers. Hunter and Linden (1923) found indications of a relation between pH of the oyster liquor and the odor and appearance of the oysters. They concluded that pH values between about 6.1 and 5.6 represent a zone in which oysters are passing from good to stale. Hunter and Harrison (1928) state that pH measurements may be of value in examining shucked oysters of questionable quality. As a result of more recent work, Piskur (1947) concluded that pH measurements may possibly be of value as an objective index of quality of shucked Pacific oysters.

In conjunction with other studies being made with shucked Eastern oysters in the College Park Laboratory several years ago, additional pH values and their relation to the degree of freshness were obtained for a number of samples of commercially shucked oysters and those shucked and blown in the laboratory. These findings are the basis for this report.

EXPERIMENTAL PROCEDURE

Arrangements were made with oyster producers to forward to the laboratory at College Park, during the season 1940-41, samples of shucked oysters that had been handled in the usual commercial manner together with a quantity of shell oysters such as were furnished to the shuckers. Both lots were to be taken, as nearly as possible, from the same lot of shellstock. Shipments were received at

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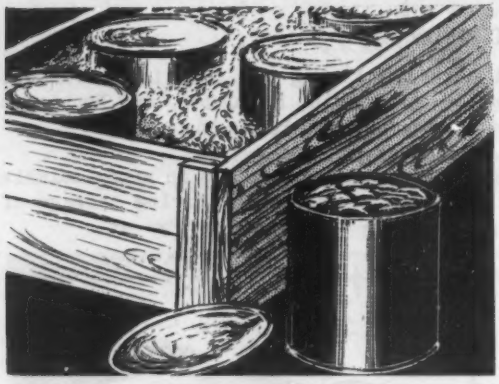
intervals during the oyster season from the more important producing areas located from Rhode Island to Louisiana.

The pH of the commercially shucked oysters was determined upon their arrival at the laboratory. The shell oysters were shucked and then washed and blown in a small blowing tank of the design used in commercial shucking houses. The initial pH of these oysters was also measured. All samples were then held in closed glass containers packed in crushed ice for storage studies and pH values were determined at regular intervals. All pH determinations were made with a glass electrode.



At the beginning of the tests, pH determinations were made on both the oyster liquor and finely ground oyster meats. It was found that the initial pH of the liquor was somewhat higher than that of the meats but the two values were almost equal after a storage period of about a week or ten days. For purposes of making the test, the liquor was found to give satisfactory results, thus eliminating the grinding that is required when using oyster meats. The odor of the combined oysters and liquor was noted at the time the pH values were determined.

DISCUSSION

Results in Table 1 include only those for oysters which arrived at the laboratory without delay and were well iced in transit. The initial values shown for the commercially shucked oysters represent the pH at the time of arrival at the laboratory and are not necessarily the same as might be obtained with oysters immediately after being prepared at the plant. The data for commercially shucked oysters and laboratory shucked oysters are paired when possible.

With only two exceptions, the commercially shucked oysters had an initial pH of 6.2 or above. All of the samples that were shucked and blown in the laboratory had an initial pH above 6.2. Some variation in pH was found in both groups.

During storage, the pH decreased gradually as the oysters became less fresh. For purposes of setting some arbitrary standard of comparison, the oysters were considered to be on the verge of inedibility when a distinct "off odor," no longer associated with that of "fresh" oysters, was noticeable. The bulk of the samples remained in good condition for ten days to two weeks before the off odor became apparent. The pH values of all of the oysters at the time the off odor was first noticed varied between 5.96 and 5.65.

It may be of interest to note that the average value for the commercially shucked oysters at this time was 5.81 (standard error of 0.036) and for the laboratory prepared samples, 5.79 (standard error of 0.015). Since the standard errors are so small, it indicates that the individual data obtained range very closely around the mean. The pH continued to decrease during storage, with the oysters becoming progressively more sour and changing markedly in appearance. For most

samples, the time required for an "off odor" to develop after the liquor reached a pH of 6.0 or 5.9 varied between three and six days.

Table 1 - pH of Liquor from Shucked Eastern Oysters Initially and at Time "Off Odor" was First Noticed

Source	Commercially shucked oysters		Laboratory shucked oysters	
	Initial*	Off odor	Initial	Off odor
Rhode Island	6.38	5.80	6.40	5.70
" "	6.40	5.88	6.30	5.84
Connecticut	6.26	5.72	6.45	5.94
"	6.32	5.78	6.32	5.72
New York	6.60	5.76	6.60	5.88
" "	6.20	5.82	6.30	5.75
" "	6.35	5.78	6.34	5.72
New Jersey	6.24	5.82	6.22	5.65
" "	6.20	5.96	-	-
Maryland	6.22	5.88	6.48	5.72
"	6.60	5.96	6.60	5.82
"	6.70	5.80	6.60	5.70
"	6.38	5.80	-	-
Virginia	5.75	5.80	6.82	5.75
"	6.52	5.80	6.45	-
"	6.40	5.92	6.52	5.78
"	6.42	5.82	6.32	-
North Carolina	6.60	5.82	6.60	5.78
Georgia	6.62	5.75	6.75	5.80
"	-	-	6.38	5.80
Alabama	6.10	5.80	-	-
Louisiana	6.30	5.82	6.26	5.76
"	6.25	5.75	6.30	5.80
"	6.20	5.85	6.28	5.84
"	6.10	5.65	-	-
Average value	6.38	5.81	6.44	5.79
Standard error		0.036		0.015

* Upon arrival at the laboratory.

These data were obtained from a relatively few samples and are not meant to be used alone as a basis on which to determine freshness of oysters. Very little information is available regarding possible variations in pH values which may occur due to season, location of oyster beds, and other factors. The data do indicate, however, that pH values are a useful index in following changes in the degree of freshness of shucked Eastern oysters and should have some value in indicating quality when used in conjunction with other tests.

LITERATURE CITED

BALDWIN, W. H.; PUNCOCHAR, J. F.; and POTTINGER, S. R.
1941. Some preliminary studies on the relative value of methods for indicating quality of shucked oysters. U. S. Fish and Wildlife Service, Bulletin F.I. 2468-K.

HUNTER, A. C. and HARRISON, C. W.
1928. Bacteriology and chemistry of oysters with special reference to regulatory control of production, handling and shipment. U. S. Department of Agriculture. Tech. Bull. No. 64.

------ and LINDEN, B. A.
1923. An investigation of oyster spoilage. American Food Journal 18, No. 11: 538-540 (November).

PISKUR, F. T.
1947. Preliminary study of correlation of pH and quality of shucked Pacific oysters. Commercial Fisheries Review (June), Vol. 9, No. 6, pp. 22-24.

MANAGEMENT OF THE OYSTER RESOURCES[1/]

By J. S. Darling *

Oyster producers and distributors are now able to devote more time and thought to the fundamental problems of production and distribution than at any time in recent years, and the fundamental problem of oyster culture which requires careful thinking at all times by oyster producers, in my opinion, is the relationship between public and private management of oyster-producing areas.

I do not desire to advocate at this time a change in the status quo of these conditions as they now exist in the several States, but to point out certain facts from my own experience in Virginia where they exist side by side. There is much that can be done by both private planters and the State to improve conditions. There is too little real scientific management of either private beds or public rocks. Too frequently, planting is haphazard and complete records are not carefully kept. Whether the oyster grounds are privately or publicly owned, there should be a challenge to the operator to determine how, where, and when the best results can be obtained. This, in many instances, can only be secured by a trial and error method, but if production is to be increased, the results should be carefully recorded and studied. In my opinion, this is particularly needed in States such as Virginia where the seed beds are publicly owned and the growing areas under cultivation are, to a large extent, privately leased, but it holds true elsewhere where private ownership may be the only tenure in effect or where State ownership of oyster grounds producing both seed and market stock may predominate.

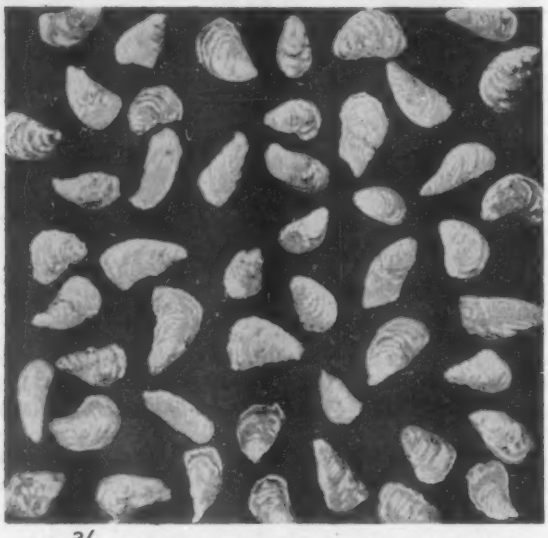


FIG. 1[2/] - YIELD FROM ONE SQUARE YARD OF CULTIVATED GROUND (1,000 BUSHELS PER ACRE).

What can be done? What can the oyster planters and packers do? The oyster planter can make test plantings of shells on grounds which he now leases or owns, or can acquire new areas which appear to be suitable for developing into suitable areas on which to plant shells. In many sections of the country, such as Virginia, shell planting has been largely neglected because of the ease with which seed could be purchased from the public rocks. The planter can also intensify his search for suitable growing grounds not now under lease, and when secured, make carefully controlled plantings to determine the value of these hitherto untried and unknown beds. These are two obvious suggestions which are as old as the oyster industry

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1/ From a speech delivered before the joint annual convention of the Oyster Institute of North America, the Oyster Growers and Dealers Association, and the National Shellfisheries Association at Asbury Park, N.J., on June 2, 1948.

2/ Square represents one square yard.

itself, but which I believe have not been carried out as generally as they should have been in recent years. Other methods to increase and improve the supply of oysters by the planters themselves will undoubtedly occur to many and add to this the many greatly needed improvements in sanitary handling, shipping, and methods of product distribution which will insure the quality and increase the demand for oysters. There is indeed more than enough for the oyster planter and packer to do.

FIG. 2[2/] - YIELD FROM ONE SQUARE YARD OF SEVERELY DEPLETED UNCULTIVATED ROCK (11 BUSHELS PER ACRE).

What can the Federal and State Governments do? The Federal Government primarily protects the public's interest, but the welfare of the industry is also a matter of public interest as we are a part of the economic structure of the country. So industry and Government should work together. The Government's interest is in part regulatory and the search for improvements here should continue. Where State governments actually own large areas comprising the "rocks, beds, and shoals of the Commonwealth", as in Virginia and Maryland, their governments assume a serious responsibility for the care and development of natural resources from which, in part, it debars private industry and initiative. If public oyster rocks are not scientifically managed and controlled, public confidence in the State's ability to do so is undermined and the public itself deprived of the benefits which might accrue to it under more efficiently operated private control. Here again there are obvious answers to what the State as owner and operator should do. With all the resources available to the State, it is in a position to make test plantings of shells and oysters, open and close areas at various seasons of the year under strictly controlled conditions, and above all, keep careful records of seed and market oysters removed from the public rocks for careful study and analysis. There are important policies to be determined and specific projects without number which could be undertaken by State regulatory authorities with a view to increasing the supply of cultivated oysters.

FIG. 3[2/] - YIELD FROM OVERCROWDED UNCULTIVATED ROCK (3,000 BUSHELS PER ACRE). SIZE AND QUALITY VARY, COSTING THE OYSTERMAN MUCH VALUABLE TIME IN CULLING.

2/ Square represents one square yard.

In my section of the country,there has been far too much reliance on nature's bounty and too little scientific experimentation. Many old oyster planters who have been in the business a long time, and their fathers before them, are too ready to accept the fact that there are many things we do not know about oyster culture as final, and make no serious effort to determine why oysters are fat one year and poor the next, or why, when the depletion of certain areas continues, it is regarded as an act of God about which nothing can be done. Such a policy will result in nothing less than further reduction in production and an eventual gradual decline until the oyster is economically in the same class as the diamond-back terrapin. Therefore, it is urged upon all concerned with oyster culture, oyster planters and packers, and all State and Federal officials, a continuous program of careful experimentation and research to rescue from further decline an industry which has potentially great possibilities of tremendous development and expansion.

NEW FISHERY FILM AVAILABLE

Basic Net Mending, a new U. S. Fish and Wildlife Service educational film, became available for distribution on September 1. The film is intended for vocational use by persons in the fishing industry.

The motion picture is in 16 mm. color and sound, and runs about 12 minutes. The outdoor scenes were filmed in New Bedford, Mass., with Captain Paul Green of that city demonstrating the proper methods of mending torn fishing nets.

Organizations which wish to borrow prints of this film should send their requests to the Division of Information, Fish and Wildlife Service, Washington 25, D. C. Because the number of prints is limited, requests for booking the film should be made as far in advance as possible. No charge is made for the use of the film.

Other recently-released fishery motion pictures which are available are: Filleting and Packaging Fish (in two parts) and Retailing Fish.

The Service is now producing the Maine Sardine Industry and the North Pacific Halibut Industry, and will announce the release dates of these educational films within the next few months.

SANITARY CONTROL PRACTICES FOR THE OYSTER INDUSTRY[1/]

By S. R. Pottinger* and J. M. Lemon*

INTRODUCTION

It is often said, that it is doubtful whether any food product in this country is subject to more stringent sanitary regulations than the oyster. The waters in which the oysters are grown for market are examined bacteriologically at intervals by health authorities. After the oysters are removed from the shell, they must again meet certain bacteriological, chemical, and physical requirements. In like manner, the shucking plant and its employees are given periodic examinations which are designed to promote the production of oysters of high quality and purity.

This system of regulation might be said to have started in 1925, when shellfish producers and health authorities requested the U. S. Public Health Service to supervise the sanitary quality of shellfish entering into interstate commerce. A system of endorsement of State control measures was accordingly developed which in turn was to be acceptable to the Public Health Service. In order for these measures to be acceptable, they had to meet certain minimum requirements established by the Public Health Service. Based on these requirements is a "Manual of Recommended Practices for Sanitary Control of the Shellfish Industry", in which are given in concise form the items of sanitation to be followed.

OYSTER BEDS AND HARVESTING

Of primary importance in the packing of oysters for market is the source of the raw material. The water in which oysters grow is sometimes contaminated by the fresh water run-off from surrounding land areas and by streams and rivers which have been polluted from sewage originating in cities and towns or even isolated houses. For this reason, it is necessary that the growing areas be examined by sanitary and bacteriological surveys prior to the approval of interstate shellfish shipments. Based on such surveys, all shellfish-growing areas are classified as approved or restricted, the latter being further subdivided as being moderately polluted or grossly polluted. The taking of oysters from the different areas so designated is accordingly regulated by the U. S. Public Health Service. It is obvious that a public health hazard may easily be involved and that the strictest adherence be given to the requirements for taking oysters only from beds that are considered safe bacteriologically.

LOADING OYSTERS

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1/ A paper presented before the joint annual convention of the Oyster Institute of North America, the Oyster Growers and Dealers Association, and the National Shellfisheries Association at Asbury Park, N. J., on June 3, 1948, with the title, "Manual of Approved Practices in Packing and Distributing Oysters."

From the first harvesting operation, the oysters are subject to sources of bacterial contamination from contact with the various steps in the production line. The oyster boats may be one source of infection unless they are well cleaned and scrubbed after each trip. Any mud or sand which drops off the oyster shells on the decks may carry over yeast spores which will, under proper conditions, reproduce rapidly and cause spoilage. Washing the oysters on the decks with high pressure nozzles may be well worth while. This would eliminate carrying mud into the shucking plants where it only adds to the hazards for the preparation of clean shucked oysters.

PLANT CONSTRUCTION

There are certain requirements that must be met regarding the construction and lay-out of the shucking and packing house. The shucking operation is, at best, one in which considerable debris must be handled and is such that the shuckers' clothing becomes quite soiled. For this reason, it is considered good practice to carry out the shucking and packing operations in separate rooms, between which is a delivery window for passing the shucked oysters to the packing room. Clean rooms or lockers are needed for storage of employees' wearing apparel.

SHUCKING OYSTERS

Shellstock held in storage prior to being shucked should be adequately protected from contamination. Floors throughout the plant should be constructed of concrete or other impervious material, free from cracks, holes, or uneven surfaces, and graded so that drainage occurs rapidly. They are much more easily cleaned than those which hold dirt and water. Smooth, washable, light-colored walls, maintained in good condition, are much more apt to be kept clean than walls which have a dingy appearance.

All cans in which shucked oysters are to be packed should be stored in a clean place and protected against contamination from dust, insects, and vermin.

Some effective means, such as screens, for preventing the entrance of insects is imperative during certain times of the year. Flies should not be permitted in the packing room. Ample light, properly distributed, is required for the workers. Lighting requirements are often covered by State regulations. The working rooms must be heated when necessary and proper ventilation for the rooms must be provided.

Separate sanitary toilets, conveniently located, properly maintained and meeting the approval of State health authorities should be provided for each sex. They should not open directly into the shucking and packing room. Adequate washing facilities, provided with hot and cold running water, a supply of soap, and individual towels are needed. A requirement for employees to wash their hands thoroughly with hot water and soap is most essential. These washing facilities should be located so that the supervisor can observe compliance with this requirement.

Workers who are known to have a communicable disease or who have open lesions or infected wounds on exposed portions of the body should not be permitted in the plant.

EQUIPMENT

In order that shucking benches, blocks, and stalls may be readily cleaned, they should be made of a smooth, nonabsorbent material free from cracks or crevices. Similarly, shucking pails, knives and blocks, and all packing equipment such as skimmers, tanks, measures and paddles, should be constructed so as not to corrode readily and to eliminate grooves and cracks which will hamper proper cleaning.

Particular attention should be given to the construction and cleaning of the blower. The surfaces with which oysters come in contact should be free of rust and paint. The pipes through which the air is blown should be easily removable to permit thorough cleaning. A connection to the air line for sterilization by steam or other means is quite important. Unless cleaned thoroughly at the end of each day's operation, the pipes will accumulate material that supports active bacterial growth. Subsequent use of an uncleaned blower will serve to inoculate the oysters with bacteria which may cause rapid spoilage. Sufficient distance should be allowed between the air pipes and the bottom of the tank to allow easy and thorough cleaning. The air intake should be protected to prevent contamination of the oysters by unclean air.

PLANT AND EQUIPMENT CLEANLINESS

Immediately following each day's operation, floors, walls, benches, shucking utensils--in fact, any equipment used in the production and preparation of shucked oysters--should be cleaned thoroughly. In addition, all utensils used in shucking and all packing room equipment should be sterilized after cleaning, by an accepted method of sterilization. After sterilization, the utensils must be stored under conditions which will prevent recontamination. Benches, blocks, and stalls should be washed with an approved disinfecting agent at the close of each day's operation. Hot water and soap applied with stiff brushes is excellent for this purpose, followed by a wash with clean hot water. After the water treatment, the entire plant should be treated with some chemical cleaning agent. There is a variety of them available for this purpose. However, there is no chemical or detergent which can take the place of hot water and a scrubbing brush.

The importance of having someone in the plant designated to be responsible for seeing that the accepted rules of sanitation, plant cleanliness, and proper handling of a food product are observed cannot be too strongly emphasized. He should be familiar, at least, with the fundamental requirements for good sanitation and should understand the reasons behind these requirements. He should be on the alert at all times to see that hand-washing by the employees is not forgotten and is done properly. It is his job to see that floors, walls, benches, shucking utensils and other equipment in the plant are given thorough daily cleaning and that the employees' wearing apparel is maintained in as clean a condition as possible. Careful observation of the health of the employees should be noted. Proper and frequent disposal of oyster shells should be made to prevent contamination of the shucked product. He should see that toilets and wash rooms are maintained in proper condition.

The job of sanitation supervisor is a highly important one and a responsible, alert person should be selected for it.

Only brief consideration of these sanitation practices is necessary in order for their purpose to become apparent. Back of each one will be found the same

reason: sanitation and cleanliness--a desire to have produced a food product that will meet the highest standards of purity. By following these practices closely, the oyster industry will find that the seemingly extra work and often-considered needless cleaning will be compensated for by a superior product reaching the market.

CLEANING SHELLSTOCK AND MEATS

So much for the sanitation and equipment angle. We also have other angles to consider in producing a superior product. The condition of the shellstock and the nature of the shucking operation is such that considerable debris, such as sand, grit, and broken shell fragments will be mixed with the meats. The quantity will vary, among other things, with the source of the shellstock and the practice followed in the shucking operation. Shell oysters from different localities and beds will vary widely in the quantity and type of debris found on the shell. Some stock will be relatively clean, with only some sand and pieces of seaweed on the outside. Other stock may reach the other extreme and be covered with a type of mud that sticks tenaciously to the shell. Regardless of the source of stock, it is believed that if more attention were given to the removal of sand and mud from the shells before opening, cleaner oysters would be obtained during shucking. The amount of washing required for cleaning the meats would thereby be lessened.

The cleaning of the oyster meats is an important step in the plant operation. The methods followed in handling and washing the shucked meats vary considerably in different sections of the country. The degree of exposure to water after shucking is subject to considerable variation. Methods used in one area will be found impracticable in another area. Some latitude must therefore be permitted in the shucking and washing method.

When oysters are removed from the shell and allowed to remain in fresh water, some of their soluble constituents are removed and some of the water is absorbed by the oysters. Within certain limits, the amount of water absorbed and soluble constituents removed is in direct proportion to the time the oysters are in the water.

In tests conducted by the U. S. Fish and Wildlife Service, it was brought out that the dry matter content of oysters blown for an extended period in fresh water was, on the average, only about 75 percent of the original amount. Salt, being very susceptible to leaching, dropped to less than 10 percent of the original value. Since the flavor of oysters is dependent to some extent on the salt and mineral content, an improved flavor is to be expected by keeping the exposure to fresh water and the blowing time at a minimum. Oysters should not be washed longer than is necessary to clean them. The degree of exposure of shucked oysters to water during production, the adequacy of draining, and the size designations are specified in the requirements of the U. S. Food and Drug Administration promulgated to establish definitions and standards of identity of shucked oysters.

REFRIGERATION

The need for adequate refrigeration cannot be overemphasized. It happens only too often that the effort taken to produce a high-quality food product is cancelled by the failure to provide sufficient refrigeration to retard spoilage. If allowed to remain at a temperature of about 50° F. or more, oysters are an excellent medium for the growth of bacteria. It is therefore essential that facilities be provided for cooling the oysters immediately after being packed. It

is highly desirable to maintain the temperature of shucked oysters between 33° and 40° F., but they should not be allowed to freeze, if they are to be marketed as fresh oysters.

The size of the container obviously will have an effect on the cooling rate of the oysters packed in it. In tests conducted by this Service, it was found that the time required for oysters initially at room temperature to reach a temperature of about 40° F., when packed in crushed ice, varied from 1½ hours in the half-pint size container to about 19 hours in a 5-gallon container. The quart size required 3½ hours, while a gallon took about 5½ hours. For optimum chilling, the smaller size containers are obviously more satisfactory.

PACKING OYSTERS

Ice used for cooling oysters should be obtained from an approved source and should be handled and stored under conditions to prevent contamination. Storage on a floor over which there is foot traffic or drainage should be avoided.

Ample refrigeration is essential from the time of packing, through distributing channels, and until used by the ultimate consumer.

PACKING AND PRODUCTION

Packing house operators should give consideration to a more widespread usage of sealed containers in order to reduce tampering to the final point of destination. All of the care put into the production of a high-quality product may be wasted through filthy handling and adulteration after it leaves the packing house.

Production should be gauged to avoid holding the oysters any longer than necessary. In like manner, distributors should make every effort to estimate probable supply and demand so that the freshest possible product will get into the hands of the ultimate consumer at all times.

In abiding by the accepted practices for the taking, preparation, and distribution of oysters, the ultimate consumer will be assured of obtaining a high-quality product of which the industry can be proud. Such product will be the best advertisement to aid in increasing consumption of this delectable sea food.

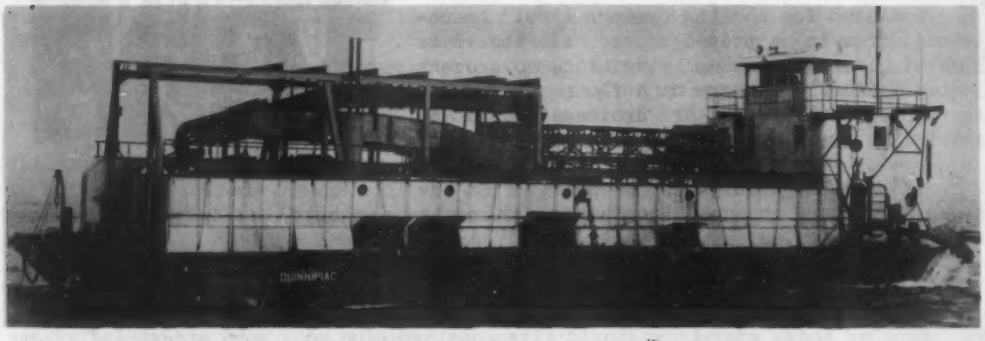
MECHANIZATION OF OYSTER CULTIVATION[1/]

PART I - RECENT DEVELOPMENTS AND IMPROVEMENTS IN OYSTER DREDGES

INTRODUCTION

The land farmer has many machines to choose from in carrying out the necessary operations of farming. He wouldn't use a spike tooth harrow to harvest potatoes. On the other hand, we in the oyster industry have been limited to one tool for all our cultivation work and much of our enemy control.

The conventional dredge has a great deal of merit, and properly handled it is a good method of harvesting oysters that are thickly planted, but it is not a good tool for controlling drills, and not efficient when oysters become scattered on the bed.



QUINNIPIAC - HYDRAULIC-TYPE OYSTER DREDGE IN LONG ISLAND SOUND

It is the industry's observation that, in the North Atlantic States, we are not raising over 10 percent of the oysters we start out with in the case of a heavy set. It is certainly a challenge to do better. No one machine is going to have all the answers to the problems of the oyster farmers any more than any one machine can solve the problems of the land farmers. The oyster industry will still have a long way to go before it handles oysters by machinery in as gentle a manner as hand tongs, and the gentle method of shoveling into baskets. The small operator who is doing that today puts out a sounder and better quality shell oyster than any of those using mechanical equipment can attain. It is well to keep in mind that oysters are living animals and that mechanical efficiency may cause damage to the oyster beds.

The entire oyster industry has for many years recognized that one of the greatest expenses in oyster production is the amount of hand labor required, and that is the reason why the industry, both on the Atlantic and Pacific Coasts, is developing mechanical means for reducing this overhead expense.

What is really needed is the development of a piece of equipment which would operate efficiently in all cases, regardless of type of bottom and depth of water.

1/ A composite of three addresses--Recent Developments and Improvements in Oyster Dredges, J. Richards Nelson; The New Flower Oyster Dredge, H. Butler Flower; The Brown Conveyor Dredge and Its Application, Dr. A. E. Hopkins, Director, Biloxi Oyster Laboratory--presented at the Convention of the Oyster Growers and Dealers Association, National Shellfisheries Association, and Oyster Institute of North America at Asbury Park, N.J., June 2, 1948. Photographs, unless otherwise noted, taken by Branch of Commercial Fisheries.

The several methods being suggested to date definitely represent an improvement over the traditional and time-worn harvesting practices.

New methods of harvesting shellfish are an absolute necessity, and the various developments being made at the present time are going a long way toward accomplishing more economic harvesting.

The term "oyster dredge", in one case, is used in this report to denote the actual dredge that is lowered to the bottom, and in another, the term is used in referring to the entire craft and its machinery. The subject matter will make the distinction apparent.

Three Classes of Oyster Dredges

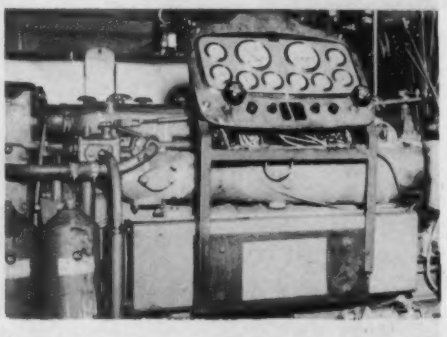
For purposes of convenience, oyster dredges are generally divided into three classes:

1. The conventional drag or rake type that is towed on the end of a chain, rope or cable and collects its catch in a bag.
2. The mechanical dredge in which oysters are lifted mechanically from the bed and conveyed to the deck of the boat.
3. The hydraulic dredge that depends on water in motion to lift the oysters from the bed and bring them to the deck of the boat.

In the first class, the recent developments have been along the lines of a stronger, lighter dredge using special steel and welding techniques in its construction. The new Flower oyster dredge falls in this category and it will be described later.

Considerable work has been done at Bivalve, N.J., to develop a lighter dredge for the New Jersey oyster industry. Another development in this lighter dredge is the dredge bar with renewable teeth; both the bar and teeth are made of special steel.

The second class is represented by the Brown Shellfish Harvester which will also be described later. According to reports, the possibilities for the use of this piece of equipment in the areas for which it is designed to work are excellent.



PUMPING EQUIPMENT ABOARD QUINNIPIAC THAT OPERATES DREDGE

The third class is represented by the Bailey dredge, developed and used on the West Coast. It really is a combination of classes two and three. Water in motion is used to lift the oysters from the beds, and a mechanical conveyor brings them from a point close to the bed up and onto the vessel.

Four Hydraulic Oyster Dredges

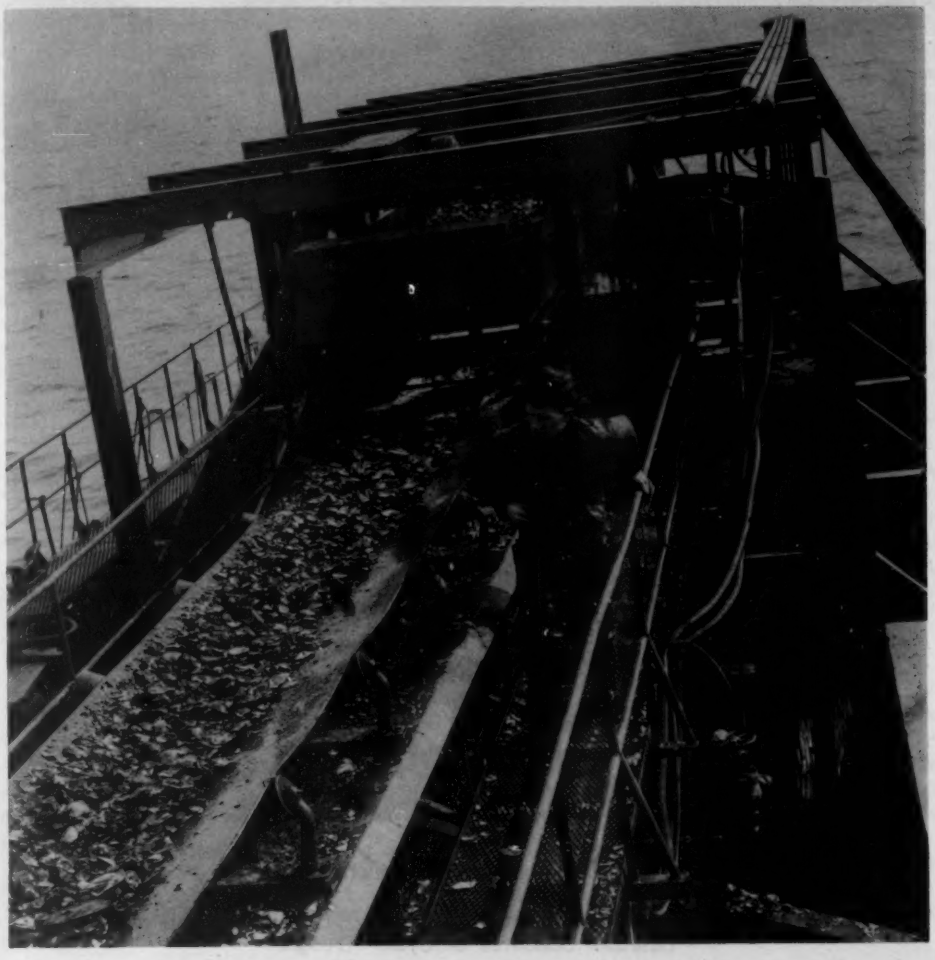
There are four hydraulic or suction oyster dredges in existence today that were designed and built for dredging oysters. The first was the Flower dredge in the Northeast using a six-inch suction pump to lift the water and oysters from the bottom.

Later, a West Coast company built a much larger craft, the Bailey Dredge, that uses two eight-inch suction pumps. Both of these dredges are successful and are doing the work for which they were designed. During the past year, two other companies built hydraulic dredges, using instead of suction pumps to pick up the oysters, force pumps discharging into a siphon or eductor which, in turn, creates the necessary suction to bring the oysters from the bottom to the deck of the vessel. Both of these dredges are quite similar as far as hydraulic equipment is concerned, but are different in respect to the type of vessel in which the equipment is used. One of these dredge vessels, the Rowe, is designed to catch its load, store it in the hold, safe from freezing, and transport it considerable distances at a rapid rate of speed. At the destination, the vessel unloads automatically on its own conveyor system. Many problems were met and solved in this dredge and a number of these solutions were useful in the development of the hydraulic dredge vessel, Quinnipiac, built by a New Jersey company.

UNLOADING OYSTERS AND SHELLS IN TRANSPLANTING OPERATION ABOARD THE QUINNIPIAC

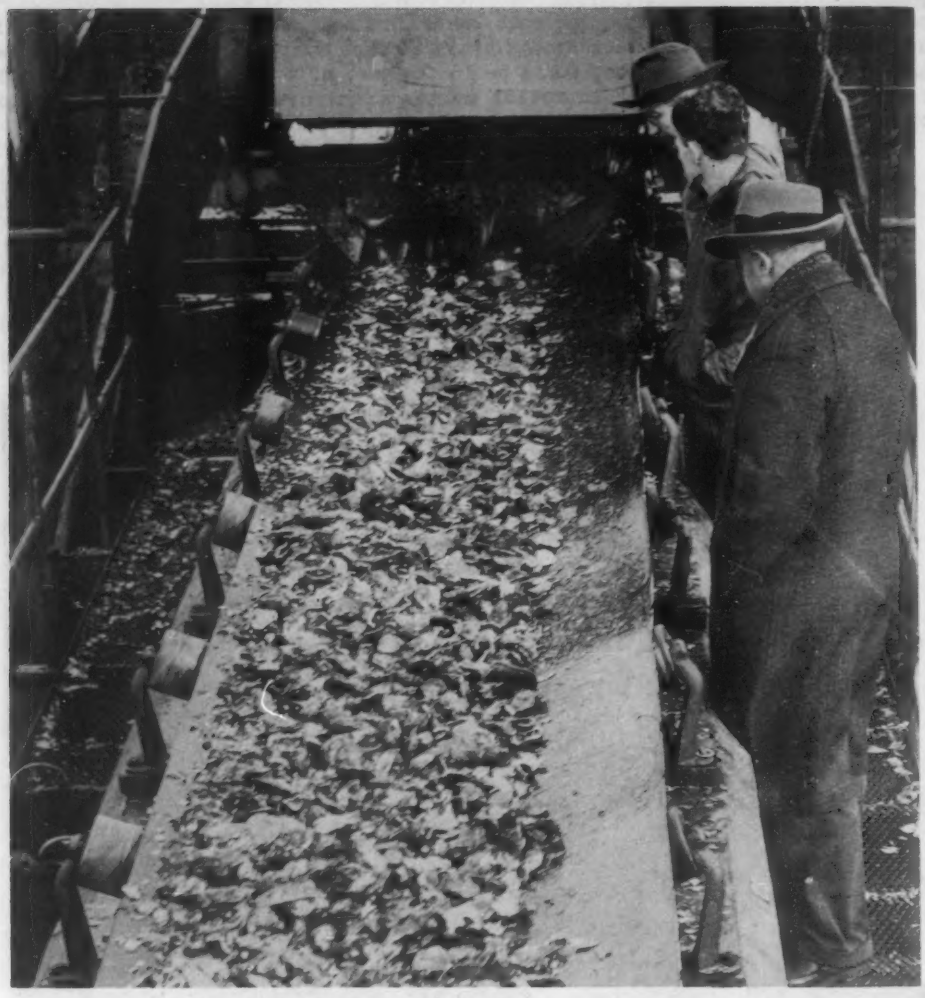
The Quinnipiac was designed primarily as a cultivating machine to be used in local areas and not for the purpose of transporting loads over long distances. Though it carries a large load, its value on the beds for controlling the oyster drill is too great to have it spend time transporting oysters.

The Rowe and the Quinnipiac both use a nozzle at the lower end of the suction hose equipped with a six-foot dredge blade so that oysters and other material are raked from the bottom as they would be in the case of a conventional dredge. They are then propelled by water in motion up the suction hose and onto a screening conveyor.



OYSTERS COMING ABOARD THE QUINNIPIAC ON CONVEYOR BELTS

The eductor or siphon principle has been used for many years in various applications, such as in bilge pumps and in the dredging of gravel and other highly abrasive materials that would cause excessive wear on pump impellers. It is believed that the use of the eductor or siphon principle does less damage to oysters and there is less wear on the equipment than would be the case with the use of an impeller pump. Another advantage of the eductor is the possibility of unloading hydraulically which can be quite advantageous, particularly in the case of shells.



CLOSE-UP VIEW OF OYSTERS AND SHELLS BEING DUMPED FROM UPPER TO LOWER CONVEYOR BELT ABOARD QUINNIPIAC

Desirable Objectives of Oyster Dredges

Recent developments in oyster dredges should accomplish the following desirable objectives:

1. More efficient catching.
2. Ease of dumping the conventional type dredge.
3. Saving of manpower.
4. Minimum damage to the crop.
5. The ability to control starfish, drills, and other oyster pests.

Objectives four and five should be the most important.

PART II-THE DEVELOPMENT OF THE FLOWER OYSTER DREDGES

Suction Dredge Developed to Combat Oyster Pests

The suction dredge was mainly developed by a private company to combat oyster drills, a common enemy of the oyster. In fact, at one time they were so bad that it was estimated that they killed well over one-half of the company's oysters each year. The drills were so plentiful that it was not infrequent for this company to screen 200 to 300 out of a dredge full of shells and oysters. Rotary screens were installed on some boats in order to screen the oysters. The drills were screened out of the oysters, but it was not possible to catch all of them off the beds. A different mode of attack was planned on this oyster enemy, the drill, also known as the screw-borer.

A nozzle was made; some second-hand hose was purchased; a common centrifugal water pump, two pulleys, and some belt was borrowed; and all of these parts were connected to a boat. After the first ten minutes of pumping with this equipment, the deck of the boat was filled with mud, sand, shells, oysters, and drills, all mixed together, and it took the balance of the day to shovel it off. It was a most successful trial, as it proved that it was possible to catch drills and do it very quickly.

Then started the process of developing and improving the suction dredge, and as a result, this company has complete control of the oyster drills on all its oyster beds. In addition, almost all of the sulphur sponge along with the fine material that has been on the beds for years was cleaned up. This company's suction dredge boat, the Pine Island, carried only 30 yards of sand, and it was loaded eight to ten times a day when the company started cleaning up their beds. In fact, it would take as long to cart it away as it would take loading it. After having cleaned up the beds the first time, it was very much faster when it became necessary to clean them again, according to reports by the company.

Uses of the Suction Dredge

Several different things have been noticed in working with the suction dredge.

First, the drills don't seem to be able to stand being pumped. It is believed that they have a weakness in their structure whereby they die after being sucked up. This has been discussed with a scientist and it is expected that some experiments will be made to see if it is the vacuum or pressure that the drills go through in being pumped up by the suction dredge which causes their death.

The oysters are also affected by this suction and pressure, but it does not kill them.

Large oysters, after being taken out of the water, are made weak for a day or two, but then they do close up tight again. From our experience, large oysters caught by the suction dredge are not too good for shell trade but are satisfactory for shucking. For handling large oysters, the new dredges being developed now should be almost as fast and easier on them.

Small oysters and set are just the thing for the suction dredge. It will handle them and cause less damage than the old conventional dredges. The suction and pressure does not harm them at all. Handling these oysters after they leave the water should be done just as carefully as when handling eggs. In fact, they

should be handled more gently as the shells are thinner and more easily broken. However, the suction dredge is first and foremost a means to clean up the oyster beds of drills, sulphur sponges, crabs, mussels, starfish, or anything else on the beds.

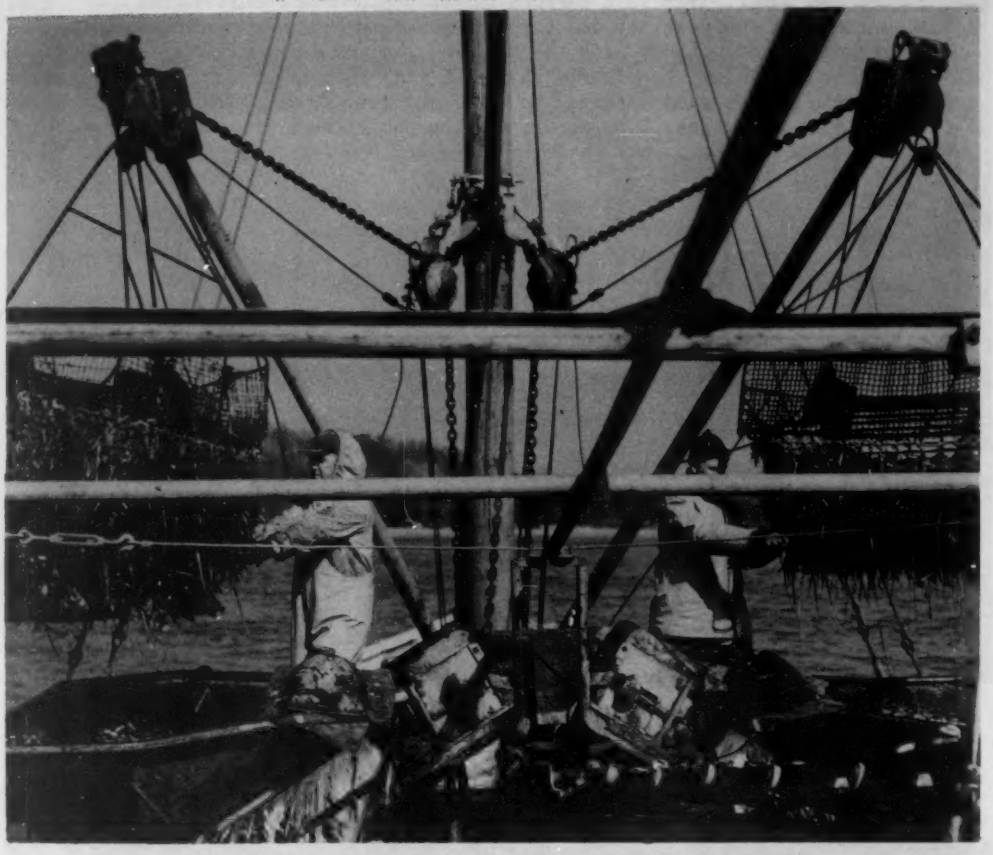
Secondly, this suction dredge can and is used to catch oysters. The suction nozzle does not have teeth. Teeth were tried, but this company found they were not needed on their beds. The suction dredge is used on all types of bottom, even on very soft mud.

Development of New Type Oyster Dredge

This same company for some time now has been working on a new type of self-dumping lighter oyster dredge to be handled on booms. The specifications were

BOW VIEW OF TWIN HARBORS

for a light, very strong, self-dumping dredge to handle five or six bushels of oysters. The booms were made with special chain blocks that would grip the chain and hold up the dredge when the second pair of hoists pulled up the booms.

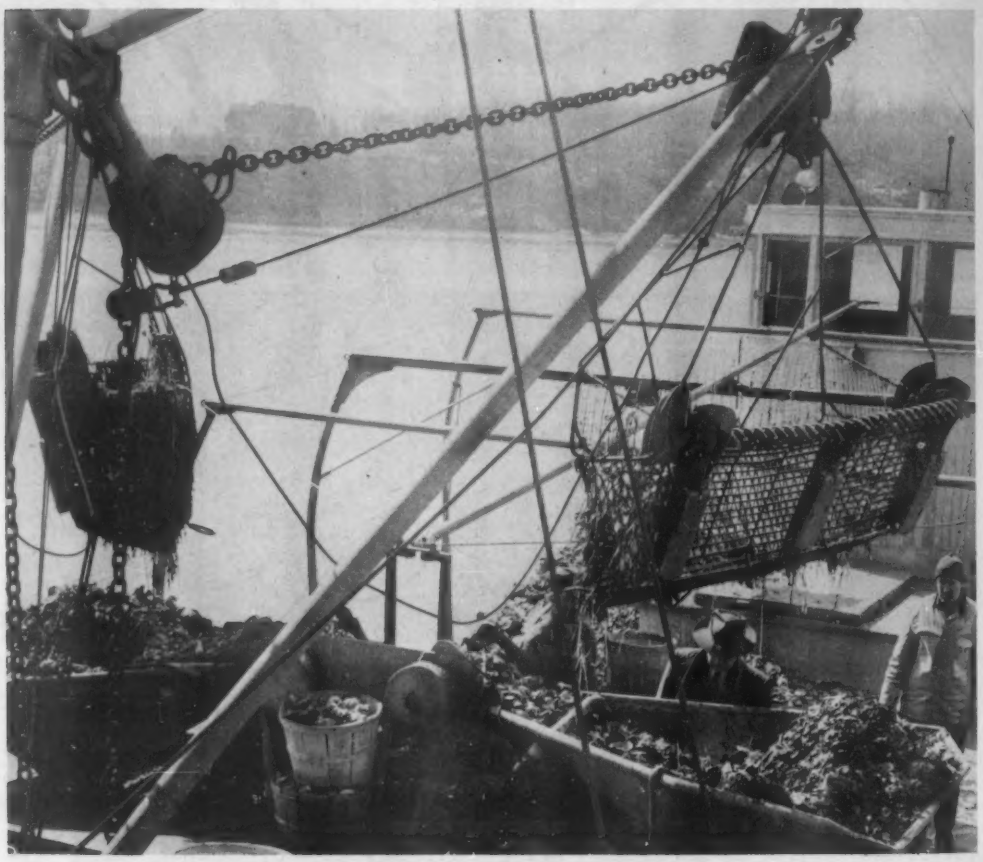


TRIPPING DREDGE DOORS FOR UNLOADING INTO HOPPERS ON TWIN HARBORS

After it was assembled, this new light dredge was tried out, but the first attempt to use it was a failure. It was then realized that the reason for making the conventional dredge so heavy was so that enough weight could be put on the teeth to dig down under the oysters. It was after very many trials and weeks later that finally a pair of chains were put on each dredge in such a way that all the weight was carried on the teeth. Also, stationary cut-boards were added. The additions were just what were needed. These dredges are the ones several different oystermen have already copied and they are very successful. They act very much like the regular dredge in regards to the length of chain needed to catch oysters at their best. In other words, they are sensitive to the length of chain, type of bottom, etc. This work was all carried out on a small boat, The Ida May. This same dredge is still in use on this boat.

A Self-loading and Unloading Oyster Dredge

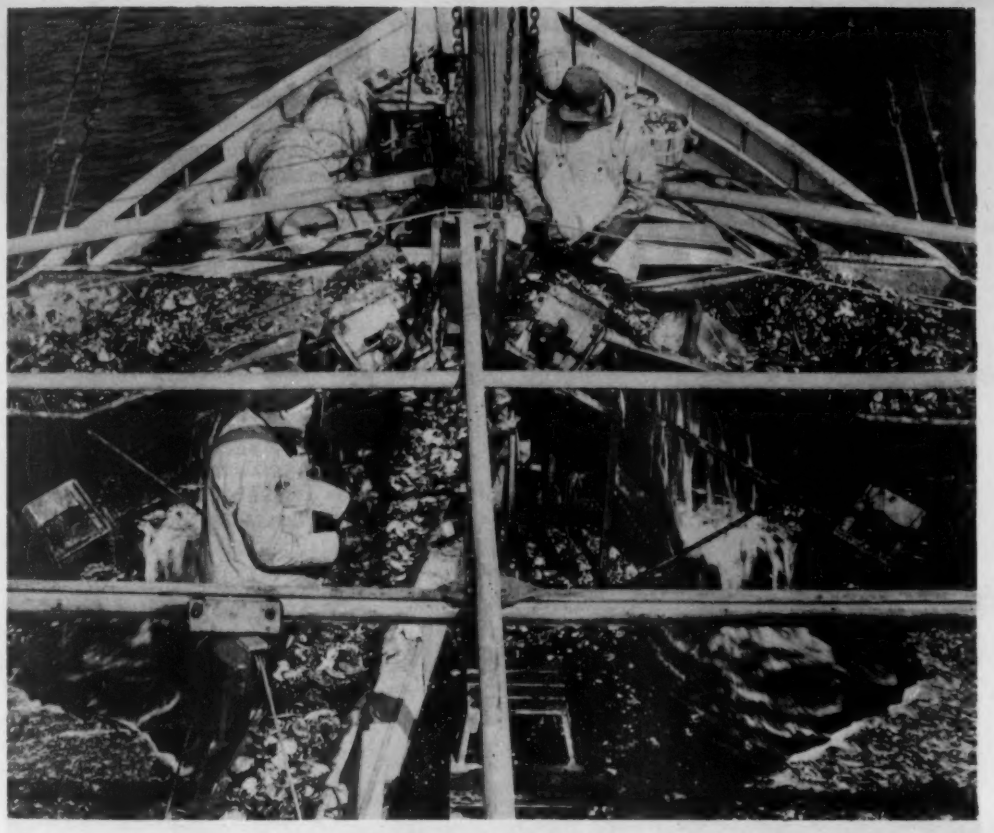
The next step was the use of self-loading and unloading machinery, but it was then necessary to have a larger boat. This machinery and a new type of oyster dredge was built. The Twin Harbors is the up-to-date result. This new dredge has some features found in the old type dredges, but not many. The teeth on this dredge are always in contact with the bottom at exactly the same angle regardless of the length of chain. The former link and ring bottoms are replaced with bars and all ride on three skids instead of dragging along the bottom. It was especially designed for uneven bottoms. It has the peculiar ability of clearing itself of mud and sand.



LOOKING AFT TOWARD PILOTHOUSE ABOARD TWIN HARBORS

Operation of New Dredge

The new dredge, however, is still too heavy, and it is intended to make the final ones out of special metals to have them light but still very strong. This dredge does not depend on its weight to catch oysters. In fact, the weight has a tendency to make it dig too much at times.



OYSTERS CONVEYOR SYSTEM. SHOWS WASHING AND CULLING PROCESS ABOARD THE TWIN HARBORS

When regular dredges are lowered to the bottom, they must have enough weight on the teeth to hold the teeth down in contact with the bottom to catch successfully. When the bag is filled with oysters, there is a drag that has a tendency to cause the teeth to be lifted off the bottom. Then the oysters on the bed go under the teeth and are mauled by the full bag being dragged over them. In the opinion of the company that built this dredge, this is the main reason for the mauled condition of the last oysters taken off the beds.

The new dredge does not act that way. The new dredge is lowered to the bottom and is pulled along by the chain the same as a regular dredge. Immediately the cut-board goes into action and pushes the teeth down on the bottom, the oysters filling up the bag section, also causing weight to be put on the teeth. As the oysters fill the bag, or rear section, it causes the cut-board to go up and out of action. That is where the weight takes over and holds the teeth down in contact with the bottom. Should any oysters go between the teeth, the rear section or bars do not touch them as there are five or six inches of space under them. This rear section rides on the skids that also control the angle of the teeth.

The first of these dredges had teeth that could be easily adjusted. Testing the angle that the teeth should be set on the bottom, it was found that on this

company's hard bottom they should be vertical to catch the best. On soft bottom they should slant back. The softer the bottom the farther back they should slant. The company's present dredges have stationary teeth just back of vertical. These new dredges also have adjustable cut-boards. The cut-board also helps keep the boat going at an even speed. The exact angle isn't known as yet. It is believed they should be automatically adjusted by the speed of the dredge as well as the length of chain used. This sounds complicated, but really is not.

These dredges are more or less in two sections. The front or pulling framework has the cut-board and this fact causes the change in the angle of the cut-board when the depth of water of the length of chain varies. Linking this cut-board up with the rear section in such a way as to compensate for the variances that occur is possible.

These dredges always go down right side up. It is almost impossible to get them over on their backs. Occasionally they will come up the wrong way, but it makes very little difference. They are dumped just the same and a slight pull at the right time on their way down turns them right side up again. They have doors in the back of the bag section that are swung open to dump them. A pair of simple catches are all that are opened to release the doors, and when they are swung closed, they automatically catch. They can be dumped out and closed in less than two seconds. They are almost self-dumping.

WASHING OYSTERS AS THEY LEAVE HOPPER ON CONVEYOR BELT

If an easy way to dump them from the pilot house could be found, it will be possible to load a boat with just a captain on board. Of course, that's not quite practical, but it has possibilities.

At present, the dredges are handled on booms, but a lot of research is still necessary to perfect them. At present, in a heavy seaway, they must be handled with caution. The booms should not be pulled aboard while the boat is wallowing in the trough of the sea, as they will swing around. The boat should head up into the sea or go with it when the dredge leaves the water to be dumped in the hopper or on deck. Controlled booms to handle them in a heavy sea are practical and possible. Booms can be held up out of the way, leaving the deck clear of the dredges and chains. In dredging with booms, it is not necessary to turn the boat when the dredge under the boat is to be pulled. The boom holds the block out away from the boat, keeping the chain clear of the bottom. This rig is especially good for dredging in very shoal water as the dredge is well outside of the bilge, making it easy to turn without getting on the dredge.

WORKING END OF THE SUCTION OR HYDRAULIC DREDGE SHOWING TEETH. ROUND AIR CHAMBER SHOWN HELPS STABILIZE AND LIGHTEN DREDGE.

The company that invented this improved dredge is more than pleased with it, since it has proven well worth all the trouble in developing it. Not only the dredge had to be designed and tested, but the booms and machinery to handle them also had to be built.

PART III—THE BAILEY OYSTER DREDGE

On the Pacific Coast in the Puget Sound and Willapa Harbor regions, the usual method of harvesting oysters is to stake a barge over an oyster ground at high tide, and when the tide is low to throw the oysters onto the barge with pitchforks. Since Olympia oysters are grown in diked areas, this method is satisfactory, and the growers can afford, because of high prices, to use a system of this kind. That procedure, incidentally, has been used very extensively for harvesting the larger Pacific oysters imported as seeds from Japan.

Such a method is necessarily rather expensive and is not usually adaptable in other parts of the country because on the Atlantic and Gulf Coasts, the range of tide is not sufficient. Most of the oyster beds on the Pacific Coast are exposed at low tide, but there are not many localities on the Atlantic and Gulf Coasts where one may walk over the oyster grounds and make a minute inspection of the oysters, as well as of any predators such as starfish and snails.

The Bailey oyster harvesting equipment was developed to eliminate as far as possible a large amount of the hand labor required to harvest oysters even on the West Coast. It is very likely that these same ideas are applicable also to certain localities on the Atlantic and Gulf Coasts.

THE BAILEY OYSTER DREDGE

The principle of the Bailey dredge is the use of water in motion to lift the oysters from the beds, and the use of a mechanical conveyor to bring them from a point close to the bed up and onto the vessel.

There is very much to be said in favor of the hydraulic type oyster harvester. It is a great step forward, not only because it takes up oysters efficiently, but also because it gives the producers an opportunity to eliminate such predatory animals as starfish and drills. In the opinion of the Director of the Biloxi Oyster Laboratory, equipment of this kind reaches its full degree of efficiency on firm, solid, clay bottom.

PART IV- THE BROWN SHELLFISH HARVESTER

Operation and Mechanics

Most of the beds on the South Atlantic and Gulf Coasts consist only of a relatively thin crust of shell on top of an extremely soft mud bottom. The ordinary oyster dredge which is dragged behind the boats is likely to do permanent damage to this superficial crust. Therefore, several States on the Gulf Coast have found it necessary to regulate dredging operations. Only at certain times are the State reefs open to dredging, although at other times tonging is freely permitted.

One type of oyster harvester which has been tried thoroughly on these types of ground and has been found to be extremely effective is the Brown oyster harvesting machine invented at Bayou LaBatre, Alabama. In this machine, the ordinary dredge idea was put into reverse by having the harvesting equipment at the front end of the boat or barge on which it is carried. Although it seems very logical, it necessarily requires mechanism whereby the dredging portion will not run into obstructions on the bottom and either destroy itself or stop harvesting oysters. However, this difficulty was overcome.

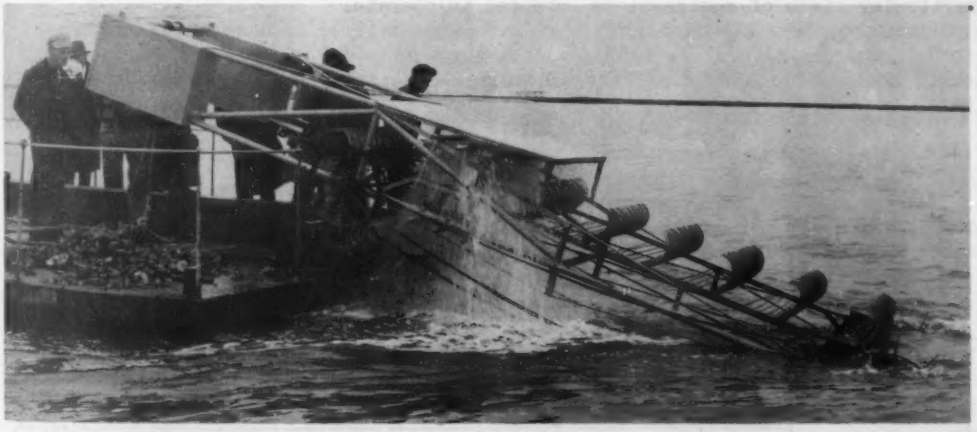
In the first place, the entire harvesting mechanism is pivoted on the front end of a self-propelled barge and counterbalanced with water tanks which may be drained or filled to maintain the correct balance. It consists of a rather simple metal framework, and a metal conveyor belt which is provided with cross-bars bearing a series of curved tines. This conveyor belt takes the oysters from the bottom, and at the same time conveys them continuously up to the deck. Very important are the crawler wheels, as they are called, which are wide flanged toothed wheels, one on each side of the actual dredging end of the harvester. Those wheels move in

the direction in which the barge is moving so as actually to drag the barge along, while the dredging tines move in the opposite direction. On fairly solid bottom, it is actually not necessary to have the engine at the stern providing propulsion unless there is a wind, in which case it is convenient to use this engine to maintain constant direction.

The tines on the cross-bars of the conveyor belt have rather a large curvature so that they can scrape the oysters from the surface of the bottom without digging more deeply than necessary. This harvester naturally can be changed to suit particular needs, but as it is at present each row of tines can carry a minimum of one-half bushel of oysters to the deck, and those rows of tines reach the deck at the rate of 16 or more times per minute. On a well populated ground, one may expect to bring aboard the barge at least seven or eight bushels of oysters per minute. In fact, this is one of the difficulties encountered in perfecting this mechanism for it is not easy to dispose of this quantity of oysters by culling, etc., and loading onto boats which will carry them to market.

For this reason, it has been necessary to install conveyor belts. One of them takes the oysters as they are brought on deck, and then loads them onto a cross adjustable conveyor belt which carries them to a boat alongside for culling and transportation.

An additional feature of the Brown Harvester is the fact that the conveyor is provided with a series of jets of water under high pressure so that the oysters reach the deck completely free of mud and debris. On some hard grounds, this would not be significant, but on rather muddy bottom the oysters need to be thoroughly washed.



BROWN OYSTER HARVESTER (COURTESY OF LOUISIANA DEPARTMENT OF WILDLIFE AND FISHERIES)

The first of these harvesters was very defective in one respect; namely, that it was made to harvest oysters from soft bottoms and not from hard rocks and reefs. The dredging tines were made of stainless steel and worked perfectly on soft bottom; however, on a hard reef in Louisiana the steel of the tines proved inadequate and the tines rather quickly bent out of shape. This deficiency has been corrected by installing tines of hard steel which defy anything on the bottom to bend them. In order to avoid damage to the tines or to the entire mechanism, the cross-bars which

bear the tines are individually sprung so that if an obstruction is encountered, the tines spring back and slide over without stopping harvesting. This is one of the most important parts of this type of mechanism for it means that it can continue working day after day without having to go up on the ways for frequent repairs.

Use for Harvesting Clams

This piece of equipment should actually not be called an oyster harvester, but rather a shellfish harvester, because it is at least as well adapted to digging clams as to taking up oysters. The crawler wheels are adjustable from the deck by turning a wheel so that the depth of penetration into the sand bottom by the tines can be adapted momentarily to the particular type of bottom and to the distance under the surface that the clams are living. Ordinarily, clams live in rather hard sand, but they are usually within four or five inches of the surface. The Brown Harvester is able to take out these clams at a rapid rate and constitutes a real improvement over the old method of digging by hand.

Use in Shallow Water

Especially in southern waters one encounters large areas of so-called "coon oysters" in shallow bayous and bays and near the shore even of larger bodies of water. The Brown Harvester has the advantage of being carried on a flat bottomed barge which draws so little water that harvesting can be carried on in water one foot deep. Even tongers in skiffs have difficulty taking up those oysters; however, the usefulness of this type of equipment is not limited to very shallow water. The machine can be made to harvest from almost any depth, although the ones so far put into use have been planned to work effectively in a depth of only eight feet. There appears to be no difference whatever in efficiency within the range for which any particular piece of equipment is intended to operate.

Production of Oysters in the United States, 1945
(Expressed in thousands of lbs. of meats and thousands of dollars; that is, 000 omitted)

Item	New England		Middle Atlantic		Chesapeake		South Atlantic and Gulf		Pacific Coast	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Oysters:										
Eastern, public	45	17	418	189	16,388	5,737	11,889	3,305	-	-
Eastern, private	2,434	1,046	13,134	5,162	16,182	5,884	4,903	1,940	9	8
Pacific	-	-	-	-	-	-	-	-	10,074	1,706
Western	-	-	-	-	-	-	-	-	151	150
Total	2,479	1,063	13,552	5,351	32,570	11,621	16,792	5,245	10,234	1,864
Percent of total	3.3	4.2	17.9	21.3	43.1	46.2	22.2	20.9	13.5	7.4

RESEARCH
IN SERVICE LABORATORIES

JULY 1948

Seattle, Wash.

Work was continued on improving the Association of Official Agricultural Chemists' tentative method for determining fat in fish meal. A study, in cooperation with the Association, was begun in order to find improvements in the method so that better verifications will be obtained. Since the extractives, being of a gummy viscous nature, tend to stick to the extraction flask and are not washed out with the cold acetone or ether which has been used in the past, it has already been found that by substituting benzol (C_6H_6) for these solvents, a much more complete transfer can be obtained.

* * *

A number of samples of fish which had been frozen at sea were obtained from the cargo of the Pacific Explorer when it was landed at Astoria, Oregon. These samples of frozen fish will be used in further studies of the effect upon flavor and keeping quality of fish frozen at sea, defrosted and filleted when landed, then refrozen and packaged for further storage and tests.

* * *

An examination of frozen yellowfin and flathead flounder fillets was made after 42 weeks of storage at 0° F. The fillets which had been prepared from frozen whole fish and refrozen for storage were slightly superior in quality to those fillets prepared, packaged, and frozen aboard the fishing vessel. The latter fillets were rancid in the surface fatty flesh, very soft in texture, and almost inedible. The refrozen fillets were preferred, on the basis of texture and flavor by the taste panel, but were only fair in quality. Judging from these samples, the storage life at 0° F. for both yellowfin and flathead flounder fillets is approximately 8 months.

Beaufort, N. C.

Studies on development of methods for producing the fish models were discontinued July 30 due to lack of funds. From March 1, since this project was in operation, 33 models of common fish species were prepared.

Boston, Mass.

The bacteriologists continued the study of the samples of clams and water taken from various areas in Maine and Massachusetts. IMVIC tests were run on cultures isolated from clam and water samples. Also, a number of microphotographs were made of organisms isolated from these samples.

College Park, Md.

Sandwich spreads for possible use in the school lunch program were prepared from grouper, burbot, bowfin, and fresh-water sheepshead. After processing, these were stored for future palatability tests.

* * *

The meat, flesh, and skin of three turkeys did not have any fish or off-flavor although the birds had been fed in the laboratory for 11 weeks on a diet containing 25 percent fish meal and one percent cod liver oil.

* * *

Storage and taste tests were conducted with frozen prepared salads containing pollock mainly to determine requirements for a dressing which can be used in frozen salads.

* * *

A representative of the Service gave demonstrations of fish handling for storage in locker plants and cold-storage warehouses at the Frozen Food Locker Plant Short Course for locker operators at the North Carolina State College.

Ketchikan, Alaska

The sampling of the clam beds in various areas of Southeastern Alaska were continued during this period. The Army Chemical Corps is assisting in the collection of the samples.

Mayaguez, P. R.

The Puerto Rican fishing company has purchased a 2-ton refrigerated truck for the purpose of distributing fish brought in by the 70-foot Puerto Rican vessel, Reina del Caribe, to the interior areas of the Island.

OYSTER STEW

1 pint oysters	1 quart milk	1/8 teaspoon pepper
4 tablespoons butter	1½ teaspoons salt	Paprika

Melt butter, add drained oysters, and cook 3 minutes or until edges curl. Add milk, salt, and pepper, and bring almost to boiling point. Serve at once. Garnish with paprika. Serves 6.

Abstract

SYNERESIS OF AGAR GELS: Fishery Leaflet 307, "Syneresis of Agar Gels," by L. S. Stoloff, formerly of the Branch of Commercial Fisheries, deals with experiments to develop a recommended method for measuring syneresis of agar gels.

The word syneresis was first used by Graham in 1864 to describe the phenomenon of breaking up of jellies on long standing or when disturbed. Since then it has come to mean the separation of any free liquid from a gel regardless of the quantity or the cause.

A technique whereby the free liquid is washed from the gel with carbon tetrachloride and is caught in an improvised measuring tube was used to study this phenomenon.

A considerable number of experiments were conducted to determine factors affecting the amount of syneresis in agar gels. Since there is no uniform relation between physical dimensions of agar gels and the amount of syneresis, it becomes necessary to establish arbitrary conditions for purposes of comparison.

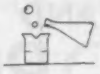
The use of 100 gm. of gel formed in a 250 ml. Erlenmeyer flask has been found convenient. The influence of rate of setting of the gel on syneresis requires that some arbitrary condition of cooling be established to give comparative results. The use of storage temperatures between 30° and 37° C. and a minimum storage period of 24 hours is indicated by the results of experiments.

Since the results also show that the relation of syneresis to agar concentration between one and two percent is apparently the same for all lots of agar, the syneresis at any concentration between these values is representative of the syneresis at any other concentration in this range. For ease in expression, it has been found best to standardize on a concentration of 1.5 percent from which the syneresis at other concentrations in the range of one to two percent can be calculated.

The findings in regard to the increase in the amount of syneresis with increase in the rate of gelation should cause bacteriologists using forced cooling procedures to re-examine the justification thereof.

Recommended Method: Prepare agar sols of 1.50 percent concentration by heating the agar in slightly less than the required amount of water in an autoclave at 15 pounds pressure for 20 minutes. Adjust the final weight to the required amount after the sols have been removed from the autoclave. Cool the sols at 45° C. before placing 100 gm. aliquots in 250 ml. Erlenmeyer flasks. Place the flasks in a 20° C. incubator to cool without forced air circulation. When the gels have set for an hour, stopper and transfer the flasks to the 37° C. incubators where they are stored for a minimum of 24 hours before syneresis is measured. Syneresis may then be expressed in ml. of liquid for these particular conditions.

The complete details of experimental work are published in Fishery Leaflet 307 of this Service. A copy of this Leaflet may be obtained from the Division of Information, U. S. Fish and Wildlife Service, Washington 25, D. C.



Additions to the Fleet of U. S. Fishing Vessels

One hundred thirty-six vessels of five net tons and over received their first documents as fishing craft during June 1948, two more than in the previous month, and four more than in June 1947, according to the Bureau of Customs' Monthly Supplement to Merchant Vessels of the United States. California led with 26 vessels documented, followed by Washington, 19; Florida, 18; and Alaska, 14. A total of 563 vessels received their first documents as fishing craft during the first six months of 1948 compared with 642 during the same period in 1947.

Vessels Obtaining Their First Documents as Fishing Craft

Section	June		Six mos. ending with June		Total
	1948	1947	1948	1947	1947
	Number	Number	Number	Number	Number
New England	6	7	26	25	55
Middle Atlantic	9	4	27	35	64
Chesapeake Bay	6	14	20	36	83
South Atlantic and Gulf	47	43	227	213	486
Pacific Coast	47	47	177	216	415
Great Lakes	7	2	25	17	45
Alaska	14	14	56	88	123
Hawaii	-	-	5	11	27
Puerto Rico	-	1	-	1	1
Unknown	-	-	-	-	1
Total	136	132	563	642	1,300

Note: Data for 1947 have been revised.

Alaska Exploratory Vessel Leaves Seattle

Exploration of Alaska's oceanic waters will be resumed after a lapse of seven years, when a Fish and Wildlife Service exploratory fishing vessel sails from Seattle, Washington, for the Bering Sea on August 23, the Acting Director of the Service announced on August 13.

The exploratory boat will make a preliminary survey for two months to determine the varieties and quantities of fish present in the Bering Sea, south of Nome, between the coast of Alaska and the International Date Line.

During this voyage, fish preservation techniques and new types of commercial fishing gear will also be tested. Results of this cruise will establish a basis for future exploratory work.

The exploratory boat, a 100-ft. motor vessel named the Washington, was transferred to the Fish and Wildlife Service from the Maritime Commission. It carries a crew of 12, including two fishery engineers and a biologist.

This cruise is the introductory phase of the Service's new, long-range Alaska Exploratory Fishing Program, authorized by the 80th Congress. In 1940 and 1941, the Service explored the southeast Bering Sea, leading to the development of the king crab fishery in that area. Because of the war, the exploratory program was discontinued.

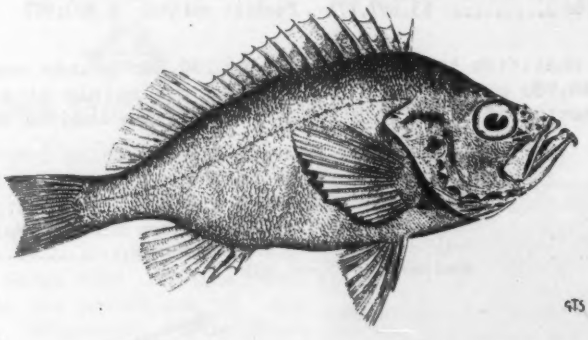
Commercial exploitation of the vast fishery resources in the northeast Pacific Ocean and the Bering Sea has been slight. Lack of specific data on the seasonal occurrence and the abundance of fish in the area, and little knowledge of actual operating requirements have curbed the fishing industry's development. After the Fish and Wildlife Service has explored the region and determined the extent of its fishery resources, the fishing industry will be able to apply the Federal findings to its own commercial operations.

The Service hopes that off-season fisheries can be encouraged in southeast Alaskan waters. Salmon and halibut, the chief ones in the region, are only summer activities.

By October 20, the Washington will be back in Seattle for alterations and refitting for more intensified exploratory work. The vessel will sail to the Bering Sea again in the spring of 1949 for additional exploratory fishing.

"Albatross III" to Estimate Fish Populations

Scientists of the U. S. Fish and Wildlife Service on board the Service vessel, Albatross III, on its fifth cruise, sailed on July 13 from Woods Hole, Mass., to make a census of the fish on Georges Bank. This was the first of a series of cruises to be made this summer to estimate the size of the fish populations. The vessel returned to port on July 21.



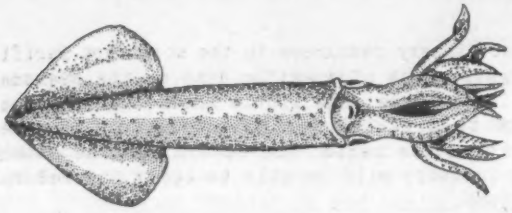
ROSEFISH (SEBASTES MARINUS)

The research vessel made tows with a large trawl net in 36 different areas on the eastern part of the bank. Information was collected on the number, size, and kind of fish taken in each area. The information will be analyzed by statistical methods similar to those used by the various popular radio and political polls. From these and future analyses, the abundance and future supply of fish on the bank will be estimated.

The cruise showed that fish of all species were very scarce in the area of the bank covered. However, some rosefish (redfish), much larger than usual size, were caught. These might be from a stock not yet touched by the fishery.

California Production of Fishery Products, 1947

The total production of fresh-water and salt-water fish and shellfish during 1947 in the State of California amounted to 793,264,905 pounds, less than the previous year's catch by 125,000,000 pounds, according to the Statistical Report on Fresh and Canned Fishery Products, Year 1947, recently released by the California Division of Fish and Game.



OPALESCENT SQUID (LOLIGO OPALESCENS)

Considerable increases were noted for anchovy, bonito, herring, jack mackerel, black and white sea bass, shark, skipjack, yellowfin tuna, yellowtail, and shrimp, while decreases were noted in landings of catfish, sablefish, sardine, clams, spiny lobster, and squid.

The total fish taken amounted to 761,074,063 pounds in 1947 compared to 854,425,916 pounds landed in 1946. The 1947 catch of 255,513,948 pounds of sardines was slightly more than half the 1946 total of 510,759,173 pounds. The fish landings included:

Fish:

Species	lbs.	Species	lbs.	Species	lbs.
Sardine	255,513,948	Albacore	13,145,780	California halibut..	1,782,089
Yellowfin tuna ..	149,066,794	Sole	12,332,749	Northern halibut....	287,912
Jack mackerel....	129,048,318	Salmon	11,428,030	Pacific herring.....	1,654,850
Skipjack.....	52,315,449	Yellowtail.....	9,952,761	White sea bass.....	1,082,792
Pacific mackerel.	46,477,205	Rockfish.....	8,495,202	Broadbill swordfish.	1,009,957
Bluefin tuna	20,837,634	Barracuda.....	2,665,385	Sablefish	902,110
Anchovy	18,940,521	Shark.....	2,637,926	Shad	305,566
Bonito	13,697,171	Pacific cultus.	1,940,597		

Shellfish landings totaled 32,190,842 pounds compared to the 1946 catch of 63,846,950 pounds. The decrease was due mainly to a decline in the 1947 squid production of 23,481,879 pounds. Among the leading shellfish items were:

Shellfish:

Species	lbs.	Species	lbs.
Squid.....	14,542,649	Spiny lobster	1,762,769
Crab.....	10,733,178	Pismo clams (meats)..	1,340,301
Rock crab..	15,225	Shrimp.....	842,773
Abalone....	2,669,950		

Federal Purchases of Fishery Products

DEPARTMENT OF AGRICULTURE, August 1948. No purchases of fish were reported by the Department of Agriculture during August 1948. During August 1947, purchases totaled 117,957 cases of canned fish valued at $361,467.

* * * * *

DEPARTMENT OF THE ARMY, July 1948. Purchases of fresh and frozen fishery products by the Army's Quartermaster Corps for the month of July 1948 for military feeding is not available.

Foreign Fish Marketing Studies

A Fishery Marketing Specialist of the U. S. Fish and Wildlife Service has recently been assigned to the Office of Foreign Agricultural Relations of the Department of Agriculture to conduct special foreign market studies on fishery products. The studies are being conducted under the Research and Marketing Act of 1946. The development of foreign markets for fish is specifically authorized by Public Law 712, which provides funds for Research and Marketing Act operations during the current fiscal year.

The Service specialist, during August, conferred with fishing industry representatives regarding prospective exportable supplies of United States fishery products at meetings in Bangor, Maine; Gloucester, Massachusetts; New York, New York; Terminal Island and Monterey, California; Seattle, Washington; and Easton, Maryland. The conferences provided information essential in planning the reestablishment of commercial fish markets abroad, and the industry's participation in the European Recovery Program.

Mr. Arthur M. Sandberg, the Service's Fishery Marketing Specialist assigned to study foreign production prospects and possible markets for United States fishery products, left the United States for Europe on August 20, and will spend two months in Europe. Upon his return, a report of his findings will be prepared and published.

Fur-seal Production for 1948

A total of 70,142 fur-seal skins were taken in the Government-administered sealing operations on Alaska's Pribilof Islands during the 1948 season. Operations began in late June and closed on July 27.

This year, 8,696 more skins were obtained than in the 1947 operations. Under the provisions of the Alaska Fur-Seal Law of 1944, 20 percent of the skins become the property of the Canadian Government. After dressing and dyeing, the U. S. skins are sold at auction to commercial fur dealers, the net proceeds going to the Treasury of the United States.

The fur-seal herd this year numbered 3,837,131 animals, an increase of 6 percent over the 1947 figures. The census is a computation of all animals, based upon observations of the number of "harem" or breeding bulls, the number of "idle" and "surplus" bulls, the number of animals killed in sealing operations, and mortality factors determined from branding activities.

Because the number of animals available for killing each year has not increased at the same rate as the total herd, the Fish and Wildlife Service is checking this year's figures obtained by the standard census-taking with aerial photography.

A plane flying at an altitude of 1,000 feet photographed every rookery (breeding place) area on the Islands at the time of greatest concentration of animals on shore. The Service is now preparing the photographs in a mosaic which will be enlarged for a verification of the census computations.

Hampton Fishery Market News Office Reopened

Fishery market news service at Hampton, Va., was reestablished and the first Fishery Products Report was issued on August 9. The office, located at 18 South King Street, with Charles D. Stewart in charge, will serve Maryland, Virginia, and North Carolina. It will receive and report landings and production of fishery products at Norfolk, Hampton, Newport News, Phoebus, Crisfield, Ocean City, and other eastern shore points, and in the Beaufort-Morehead City area in North Carolina.

Teletype communication with the New York City fishery market news center has been established to assure close contact with the Service's other market news offices.

Daily Fishery Products Reports and monthly and annual summaries on landings of fishery products and cold storage holdings will be issued.

The Hampton office was originally opened in December 1945. Because of the lack of operating funds, it was closed in May 1947. It is the seventh fishery market news center to be established by the Fish and Wildlife Service since 1938, when the New York office was opened.

International Conference Proposes New Sea Safety Measures

The recent International Conference in London proposed a new Convention on Safety of Life at Sea which will provide for considerable improvements in maritime safety throughout the world, according to the July 1948 issue of the Coast Guard Bulletin.

The proposed Convention, and the Regulations annexed thereto, will come into force upon ratification by 15 delegate nations, 7 of which must have merchant marines of over 1,000,000 gross tons each.

The international sea-safety regulations bring up-to-date the maritime safety matters from the last conference in 1929 and provide for greater passenger and cargo vessel safety.

In general, the changes proposed applied mostly to passenger vessels and cargo vessels.

Among the changes are proposed a new and simplified system of ship-to-shore signals for all stranded vessels, cargo and passenger; and the continuation of the International Ice Patrol with the cost being borne in proportion by the nations who benefit from it the most.

In addition, many improvements have been incorporated which will substantially meet a need that has developed since the last major changes in the Rules of the Road were made in 1889.

Thirty-two nations were represented at the Conference which opened April 23 and closed June 10.

The international safety regulations under which fishing vessels operate and the transporting of fishery products by coastwise steamers from Canada, Newfoundland, and Alaska come under the proposed new Convention.

New Jersey and Delaware Fisheries Survey

A survey of the New Jersey and Delaware marine fisheries by the Service was begun the early part of August.

Statistics on the volume and value of landings, methods of catching, number of fishermen employed, number of fishing craft used, and quantity of fishing gear utilized by fishermen in waters off New Jersey and Delaware during the past year will be collected.

The information will be the basis for determining the condition of these fisheries, and is required by biologists in recommending necessary action to preserve the fishery resources of the area.

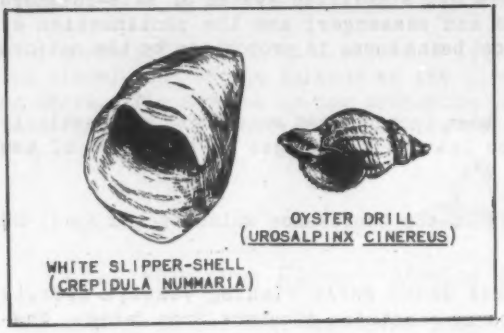
The survey will be completed by the end of the year, but the results will not be known until next spring. Two Fish and Wildlife Service Fishery Marketing Specialists, Ray H. Wilson and R. G. Personius, will conduct the survey.

The last survey of New Jersey and Delaware fisheries was made for 1945. It showed a catch of 208,000,000 pounds, valued at $11,000,000 for New Jersey fishermen, and a catch of 169,000,000 pounds, valued at $2,100,000 for Delaware fishermen. No survey was made for 1946 because of the lack of funds.

New Poison Controls Oyster Pests

A practical method of controlling and destroying the dread Japanese oyster drill has been discovered, according to a report issued by the Washington State Department of Fisheries on August 5. This pest was accidentally introduced from

Japan with the early shipments of seed oysters and has become established in the Olympia oyster beds of southern Puget Sound. It causes great damage by its drilling through the shells of the oysters and sucking out the meats.



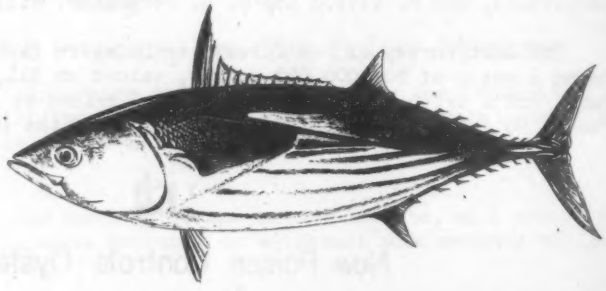
The scientists working at the State Shellfish Laboratory at Gig Harbor, Washington, have discovered that low concentrations of mercuric chloride of corrosive sublimate will kill the drills without harming the delicate oysters. The poison is placed in the dikes, which hold water over the oysters during low tide, and in a short time the pests discontinue their drilling and soon die.

Washington State biologists report that corrosive sublimate will also destroy Crepidula, commonly known as the cup or slipper shell, which competes with the oysters for space and food. The Crepidula multiply rapidly and take the space in the dikes which was meant for the oysters. Growers have often reported removing ten sacks of cups to obtain one sack of oysters.

According to the report, by eliminating Japanese oyster drills and cups, the production of Olympia oysters can be greatly increased.

Progress Report of Central Pacific Exploratory Vessels

Young oceanic skipjack about five inches in length have recently been collected in Hawaiian waters by an observer of the U. S. Fish and Wildlife Service aboard the bait boat Oregon. These are the smallest known oceanic skipjack from this region and indicate that the species must spawn in the vicinity. This discovery may well be of considerable biological importance. Although the location of tuna spawning grounds in the Pacific has long been a mystery, last year saw the collection of extremely young oceanic skipjack off Central America and in the Marshall Islands by Fish and Wildlife Service biologists.



SKIPJACK

The Oregon and the seiner Alaska, both exploratory fishing vessels, will embark on a survey of the tuna fishing grounds around the many outlying islands and banks of the Territory of Hawaii, which are not now utilized by local fishermen. The aims of the survey will be to locate new live bait grounds (see Western Caroline Islands, p. 54 of this issue), new tuna

fishing areas, and to try out the two principal types of West Coast fishing gear in such new areas. Two Service observers aboard the Alaska will accompany and report upon their success.

The two vessels were completely overhauled in Honolulu, following their extended trips in Oceania. During these overhauls, the Service observers have been securing information on live bait and tuna fishing methods around Oahu. Such information should be of value in fishing operations in new regions.

Sardine Management Program

An intensified sardine management program with drastic seasonal quotas has been recommended by marine research biologists of six Pacific Coast governmental agencies, according to the July 14 issue of Outdoor California of the California Division of Fish and Game.

During their tenth annual meeting at the California Academy of Sciences, sardine experts from Canada, Washington, Oregon, and California also heard plans to include the study of oceanography in pilchard research. Coordination of official investigations was urged due to the "sardine failure during the last two years."

Attending the meeting were representatives of the California Division of Fish and Game, Scripps Institute of Oceanography of the University of California, U. S. Fish and Wildlife Service, Fisheries Research Board of Canada, Washington Department of Fisheries, Oregon Fish Commission, and observers from the California Academy of Sciences.

School Lunch Funds Allocated

Funds for the operation of the National School Lunch Program have been allocated to the States and Territories for the fiscal year ending June 30, 1949. Of the $75,000,000 appropriated by Congress, $58,000,000 has been apportioned to the participating States, the District of Columbia, and the Territories of Hawaii, Puerto Rico, the Virgin Islands, and Alaska. The unallocated portion, aside from funds needed for administrative expenses, is available to the Department of Agriculture for the purchase and distribution of specific food to schools participating in the program.

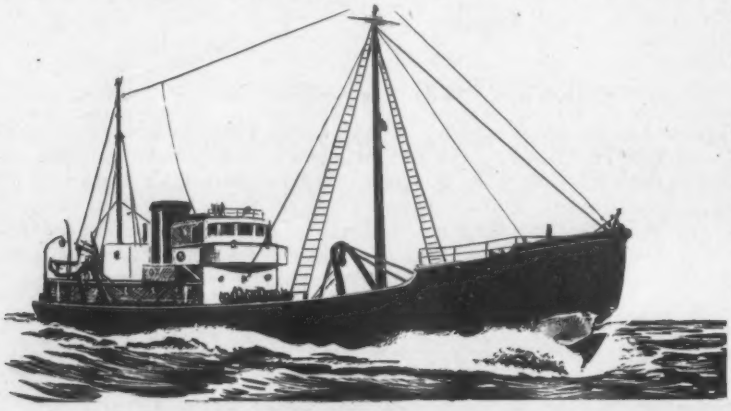
It should be explained that the law requires that all Federal funds accepted must be matched by funds from sources within the States. Therefore, the total amount expended for school lunches is much more than these figures and the total value of the lunches served is even greater. A list of States and Territories, giving apportionments of Federal funds for the year are as follows:

Alabama	$2,176,615	Maryland	$ 652,038	Pennsylvania	$3,372,863
Arizona	314,016	Massachusetts	1,266,211	Rhode Island	205,175
Arkansas	1,493,870	Michigan	2,199,026	South Carolina	1,552,490
California	2,234,556	Minnesota	1,120,928	South Dakota	241,927
Colorado	431,612	Mississippi	2,195,452	Tennessee	1,840,929
Connecticut	479,572	Missouri	1,388,037	Texas	3,516,239
Delaware	77,632	Montana	176,312	Utah	322,312
District of Columbia	151,622	Nebraska	483,898	Vermont	148,563
Florida	955,848	Nevada	29,717	Virginia	1,494,769
Georgia	2,115,473	New Hampshire	198,202	Washington	679,624
Idaho	214,947	New Jersey	1,012,341	West Virginia	1,131,379
Illinois	2,074,435	New Mexico	358,555	Wisconsin	1,159,648
Indiana	1,372,525	New York	3,029,898	Wyoming	99,466
Iowa	937,746	North Carolina	2,512,041	Alaska	11,648
Kansas	737,378	North Dakota	266,645	Hawaii	89,302
Kentucky	1,898,044	Ohio	2,344,665	Puerto Rico	2,112,044
Louisiana	1,634,301	Oklahoma	1,399,047	Virgin Islands	37,006
Maine	380,689	Oregon	470,722		

Fish dealers should contact local school lunch agencies throughout the area they serve to ascertain the extent of their activities. Contacts made by the Fish and Wildlife Service with the U. S. Department of Agriculture indicate a keen interest in fishery products for school lunches. A pilot program to explore the possibilities for the use of more fish in schools was sponsored by the Department of Agriculture last spring.

Shore Processing of Fish Frozen at Sea

A project to freeze fish at sea for later processing on shore is the chief item on the technological research program of the U.S. Fish and Wildlife Service's Branch of Commercial Fisheries for the new fiscal year.



MODERN TRAWLER

Specific recommendations of the fishing industry have been incorporated in the new program.

The recommendations were presented at a conference held in Washington on July 14. Fish and Wildlife Service officials met with representatives of varied fields in the fishing industry at that time.

The practice of freezing fish at sea for later processing on shore has been considered impractical. But preliminary tests, using new techniques, have encouraged the industry to request additional research.

The fish will be frozen aboard fishing vessels soon after catching, and will then be defrosted on shore. At that time, fillets will be cut, refrozen, and stored. If the experiments show that the quality remains high in the fish originally frozen at sea, the Fish and Wildlife Service will then test and recommend new refrigeration and processing methods for the fishing industry.

Fishing vessels will be able to remain at sea for longer periods of time if the tests are successful. Valuable byproducts will be saved because the fish will no longer need to be dressed at sea, and labor and production problems in shore plants will be decreased because of the even supply of frozen fish for filleting.

Another important activity of the new technological research program is a plan to prepare canned sandwich spreads of chum salmon, mackerel, lake herring, rockfish, and pollock for use in the Federal-financed school lunch program. This work may develop another commercial outlet for these species.

Canned fish spreads are now on the commercial market, but they are expensively prepared, and are not suitable for school lunch consumption. Sandwich fish spreads made by the Fish and Wildlife Service have already been used in two Maryland elementary schools, and they were favorably received.

The research work is to be conducted at the Fish and Wildlife Service Laboratories in Seattle, Wash.; Boston, Mass.; College Park, Md.; and Ketchikan, Alaska.

Sockeye Salmon Run Heavier

A substantial increase in the sockeye salmon run this season over previous cycles was announced on August 5 by the Chairman of the International Sockeye Commission. With nine days remaining in this year's legal season on the American side, the total catch already exceeds that of the previous cycle year, 1944, by 10 percent. In 1944, the total season's catch was 435,000 fish. On August 2 of this year, the catch was 490,000 fish. Special closed seasons have resulted in considerable improvement in the escapement of early runs through the Hell's Canyon fishways recently completed by the Commission.

With 25 cents per pound being the price paid by canners, substantial incomes would be received by the many thousands of fishermen now operating on the fishing grounds.

Tests of Canned Fish Spreads

For the past year, a technologist at the Service's laboratory in College Park, Md., has been working up canned sandwich spreads made of fish.

While the general consumer has been able to buy canned meat spread for more than 50 years, spreads made of fish are comparatively new. "Specialty" spreads made of fish are imported from Europe, but they are prepared for a limited, high-priced market.

The canned fish spreads are being made for possible use in the Federal-aided school lunch program. As non-perishable, inexpensive, and ready-to-use products, the canned fish spreads may also give commercial canners a new market.

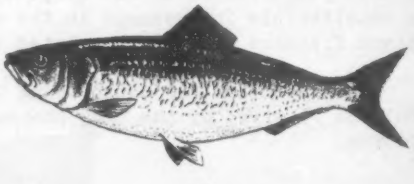
A finished formula for the spread has not been perfected yet, for this work is still in the experimental stage, but the results have been favorable so far. A formula is expected to be ready before the end of the year.

More than 40 species of fish have been tried in canning tests, and it has been decided to use chum salmon, mackerel, pollock, lake herring, and rosefish for large-scale production. These species are inexpensive and are available in large quantities.

Twenty Tagged Shad Recovered

Because of successful U. S. Fish and Wildlife Service tagging operations, scientists now know more about the life of the shad at sea than ever before. The Chief of the Service's Branch of Fishery Biology announced on August 16 that 20 of the 236 shad tagged last August in the Gulf of Maine have been recovered by fishermen in coastal rivers from Georgia to Massachusetts. The sea-dwelling shad were tagged to determine their inshore points of origin.

The shad spends most of its life in oceanic waters, but migrates into fresh water rivers to spawn. Little has been known of these spawning migrations. The results of the tagging operations now show that adult shad school up together in oceanic waters to feed, regardless of their native river habitats. When the spawning period approaches, the schools of shad at sea break up, and the fish return to their native rivers. Eventually, the shad leave the rivers to feed at sea.



SHAD

In cooperation with the Department of Sea and Shore Fisheries of the State of Maine, the shad were tagged by the Fish and Wildlife Service off Mt. Desert Rock in the Gulf of Maine, 17½ miles off the Atlantic Coast. Before the tagging operation was performed, it was unknown that the shad migrated to this area for feeding from different Atlantic coastal rivers. The operation demonstrates the interest which each individual Atlantic coastal State has in the marine shad fisheries.

This was the first tagging operation made to study the dispersion of feeding shad in oceanic waters.

Celluloid discs, specially designed for shad investigations, were attached to the cheeks of the fish with stainless-steel rivets. The tags were numbered,

and contained data as to where and when the shad were released. The tagged shad were removed from purse-seines, in which they were captured while feeding on the surface of the Gulf of Maine's shallow water.

Late in August, at least 1,000 shad were tagged in the same area for additional migrational studies.

Wholesale and Retail Prices

The wholesale index for all commodities on July 17 increased 2.4 percent compared with the previous month, and showed an increase of 13.9 percent over a year ago, according to the Bureau of Labor Statistics, U. S. Department of Labor. The percentage of increase in the wholesale index for foods was even greater than that for all commodities, and was mainly due to increases in meat and fish prices. The wholesale index for foods on July 17 increased 6.2 percent over the previous month, and 15.3 percent over July 12, 1947.

Following the same trend as for other foods, the wholesale prices of canned pink and red salmon also continued to increase during July, and compared with a year ago, canned pink salmon was 41.9 percent and canned red salmon 17.6 percent higher. Both of these items were selling at higher prices during the month of July.

The rate of increase in retail food prices was a little less than the previous month, but the retail food index for 56 large cities reached a high of 216.8 percent of the 1935-39 average as of July 15. As of June 15, the fresh and frozen fish index showed a substantial decline, but as of July 15, this decline was not only canceled, but increased 0.8 percent compared with June 15, and 9.7 percent compared with a year ago. This increase in fresh and frozen fish was mainly due to a strengthening of the frozen fillets market with prices during the first part of July increasing over the previous month. The average retail price of canned pink salmon continued to increase and, as of July 15, increased 0.7 percent compared with the previous month and 28.5 percent over a year ago.

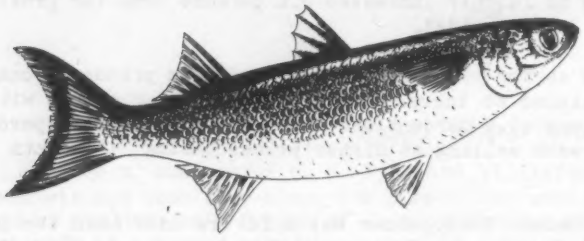
Wholesale and Retail Prices

Item	Unit		Percentage change from--	
Wholesale: (1926 = 100)		July 17, 1948	June 12, 1948	July 12, 1947
All commodities	Index No.	168.9	+2.4	+13.9
Foods	do	191.2	+6.2	+15.3
Fish:				
Canned salmon, Seattle:		July 1948	June 1948	July 1947
Pink, No. 1, tall	$ per doz. cans	5.418	+2.8	+41.9
Red, No. 1, tall	do	6.649	+3.9	+17.6
Cod, cured, large shore, Gloucester, Mass.	$ per 100 lbs.	14.50	0	+ 7.4
Retail: (1935-39 = 100)		July 15, 1948	June 15, 1948	July 15, 1947
All foods	Index No.	216.8	+1.3	+12.3
Fish:				
Fresh, frozen, and canned	do	301.6	+0.8	+15.7
Fresh and frozen	do	253.9	+0.8	+ 9.7
Canned salmon:				
Pink	¢ per lb. can	53.5	+0.7	+28.5

FOREIGN

Australia

FISHERIES OF WESTERN AUSTRALIA: The larger type of fishing boats are almost unknown in Australia, most of the fishing being done by 30- and 35-foot craft with sail and auxiliary power, according to a letter received from South Perth, Western Australia. There are only about seven of the larger-type boats in operation at present, 66 feet in length, powered by a 272 h.p. American marine diesel engine, with a fuel capacity of 1,250 gallons and a range of 2,500 miles. These are designed as power boats with quarters forward, engine room forward of amidships, and all cargo space aft. The latter is insulated and fitted with refrigerating machinery to hold 18 tons at 32° F.



SEA MULLET (MUGIL DOBULA)

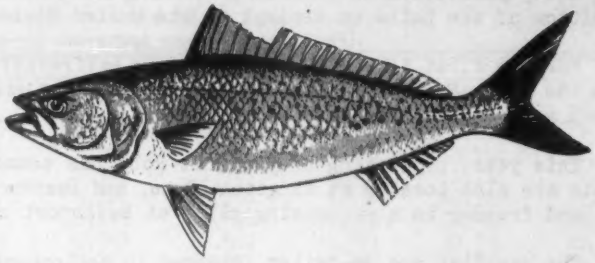
The freezers aboard these vessels are ammonia plants powered by a 15 h.p. motor driving a 6.5 ton compressor with 1,800 feet of coils. Coils in the hold are all welded. A large number of coils are set horizontally at one end to provide a fast freezer, and at the other end stowing compartments have a number of vertical coils. The air is stirred by two fans driven from a generator coupled to the refrigerator engine or from the main lighting system.

The capacity of the freezers on board for "hard-freezing" the catch is limited. The fish are frozen "hard" to allow for handling and shipping south in the freezer holds of coastal ships which take about two weeks to get the catch to shore freezers. In this region, there are altogether 35 boats working the Sharks Bay area, mostly 30-odd footers, and seven large refrigerated craft. Those boats without refrigeration rely entirely on shore freezers to preserve their catch.

Fishing by these boats is conducted north of the winter storm belt, mainly inside Sharks Bay, a very large expanse of sheltered water where sea mullet (Mugil dobula) and similar inshore fish abound. These are caught by the simple means of setting a light mesh or gill net around the schools of fish. Nets are set from small boats which are rowed or even punted, for the sake of silence. This method, together with some set netting and hand-lining, averages 10 metric tons for two weeks of fishing.

Some of the larger boats are contemplating introducing a medium-sized otter trawl. To date, it is untried in these waters except for experimental work. Very few in this area have had any practical experience in otter trawling, Danish seining, and purse seining.

Australian salmon (Arripis trutta) makes up approximately 60 percent of the catch in Western Australian waters. The season for this fish runs from February to September. Found in quantity only on the South coast, the fish are driven in behind beach reefs by sharks and are scooped out by the ton in whatever type of net available. Some use ex-Army camouflage netting. Salmon brings $96 to $113 a metric ton on the average, at the canneries, and can be caught in 50-ton lots. Lack of transportation facilities limits the production. Another limiting factor, according to the fishermen, is the insistence of the canneries on the fish being delivered headed and gutted, although the catch is made within 10, 15, or, at the most, 25 miles from the cannery, and the fish are never more than three or four hours in transit.



AUSTRALIAN SALMON (ARRIPIS TRUTTA)

Beach-seining and hand-lining are really the main types of fishing practiced in Australia. The main species caught are sea mullet (Mugil dobula), tailor (Pomatomus pedica), Australian salmon (Arripis trutta), and a local herring.

There is a small amount of long-lining, locally known as setlining, for sharks. The lines used for this type of fishing are extremely heavy and are buoyed to fish the surface waters. Consequently, two large sharks are a "good" catch for one set of the line. The most common species caught is the tiger shark (Galeocerdo rayneri).

GUMMY SHARK (EMISSOLA ANTARCTICA)

Long-lining on the bottom brings good catches of school shark (Notogaleus rhinophanes) and gummy shark (Emissola antarctica). School and gummy sharks are mainly confined to the portion of the coast from Fremantle to the Eastern portion of the South Coast.

There is a demand at present in this country for albacore tuna for the fresh fish market. These tuna are caught by trolling. It is reported that if any quantity can be produced, even seasonally, one of the local canneries could use the catch.

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CRAWFISH (CRAYFISH) INDUSTRY: A South Australian Fishermen's Co-operative would export more crayfish tails to the United States this summer than the total quantity of lobster tails frozen in the Australian States in 1945, according to the Australian Fisheries Newsletter, June 1948.

The export is essential for the stabilization of the crayfish industry in South Australia (by the prevention of local gluts) and is welcomed by hundreds of South Australian crayfishermen. The export of crayfish tails applies only to surplus production.

Every precaution is taken in processing and packing to ensure the satisfactory condition of the tails on arrival in the United States.

For the first time, an automatic mobile freezer for transporting products from the South-East overland to Adelaide is being used. All crayfish tails for export are carried in this freezer.

This year, processing crayfish at Robe has commenced. Crayfish processing plants are also located at Kingston, Robe, and Beachport. To allow for expansion, a second freezer in a processing plant at Beachport has been built.

The crayfish are de-tailed, wrapped in cellophane, graded according to their weights, then boxed in 30-pound containers. Before being shipped, all consignments are subject to examination by the Australian Fisheries Department.

The crayfish season at the Abrolhos Islands, from 35 to 60 miles offshore from Geraldton, started with a rush on March 16. This year, nearly 60 men are engaged in the fishery, and the indications are that last year's take will be considerably exceeded. About two-thirds of the catch is being de-tailed and frozen for the American market, and most of the balance is being canned at the local cannery.

TO ESTABLISH WHALING INDUSTRY: A Norwegian whaling advisor engaged by the Australian Commonwealth Government, soon after his arrival in Australia, together with the Australian Director of Fisheries, visited Western Australia to investigate proposals to establish shore-based whaling stations. However, the advantages of whaling from a factory ship were considered so great that the Commonwealth Fisheries Office is endeavoring to locate a vessel suitable for conversion into a factory ship. Every effort will be made to establish an Australian whaling industry, in accordance with expert advice, on a sound factory ship basis.

It is proposed to re-establish the old shore station at Point Cloates where some preliminary work has already been done.

Canada

BRITISH COLUMBIA SALMON PACK AT SIX-YEAR HIGH: British Columbia's salmon pack for the current season totaled 355,697 cases on July 31, a six-year high, according to the August 14th issue of the Canadian periodical, Foreign Trade. Unexpected large runs of pink and chum salmon have accounted for a marked increase in the current pack. It also appears that larger quantities of springs, steelheads, bluebacks, and coho salmon are being canned this year, instead of being processed in the fresh and frozen forms.

Since 1948 is a small cycle year insofar as the popular sockeye variety is concerned, production is down for this particular salmon. The large run of sockeye salmon takes place every four years. The last big pack of sockeye was in 1946, when 543,027 cases were put up.

Earlier estimates by the Department of Fisheries placed the 1948 pack at less than 900,000 cases, but with the large runs of pink and chum salmon materializing, it is anticipated that the current pack should reach 1,000,000 to 1,250,000 cases. The following are the figures for the 1948 production as of July 31 in comparison with previous packs:

British Columbia Salmon Pack
(In cases--48 one-pound cans or equivalent)

Species	For Week Ending					
	July 31 1948	Aug. 2 1947	Aug. 3 1946	July 28 1945	July 29 1944	July 31 1943
Sockeye	146,245	224,257	154,238	211,889	139,880	112,236
Springs	8,734	3,208	4,095	3,971	3,114	3,787
Steelheads	1,932	977	1,715	1,055	1,224	623
Bluebacks	17,787	4,306	2,168	6,656	10,373	12,184
Coho	50,450	33,415	25,546	31,212	14,064	30,944
Pinks	94,082	32,583	31,542	41,740	40,736	42,198
Chums	36,467	25,319	35,631	10,413	8,811	9,300
Totals	355,697	324,065	254,945	306,926	218,202	211,272

Exports of canned salmon for the five months ended in May of this year totaled 15,326,800 pounds and were valued at $4,754,011. Shipments have been made to 48 countries. In 1947, 36,814,300 pounds of canned salmon, valued at $9,759,051, were shipped to a total of 47 countries.

The leading countries importing Canadian canned salmon in 1947 were:

Destination	lbs.	Value - $
United Kingdom	18,508,800	4,482,175
Union South Africa	2,390,500	696,039
Australia	2,553,100	688,860
Belgium	6,476,200	2,099,564
Philippines	1,049,900	257,190

While the critical currency situation may preclude further shipments of canned salmon being made to the United Kingdom and other sterling area countries this year, indications are that there is a good demand for this commodity in Belgium, South Africa, Mexico, and other markets.

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EXPANSION OF FISHERIES DEPARTMENT SERVICES OUTLINED: At the request of the Fisheries Council of Canada, the Honorable Mr. R. W. Mayhew, newly elected Minister of Fisheries, provided a statement which enlarged upon the observations he made when presenting the annual and supplementary estimates of his Department to Parliament, according to the June-July 1948 issue of the Fisheries Council Bulletin. Excerpts follow:

"Canada's 1947 fisheries production, as estimated by the Department's economists had a marketed value of about $117,500,000. As compared with 1946, there was a decrease of $3,600,000, but 1946 was Canada's record year in dollar returns from the fisheries. The 1947 total exceeded 1945 by well over $3,000,000.

"In the United States, demand is firm and fish prices are relatively high. Present information indicates that the market there will absorb all the fresh and frozen fish available to it, and fresh and frozen fish is the principal single item in our trade across the border.

"About two months ago, our Fisheries Prices Support Board placed orders with East Coast producers for 190,000 cases of canned fish, representing about $1,750,000. The main purpose is to support the income of fishermen who diverted their catches to the canning industry for the production of canned fish for war and postwar emergency purposes, and to permit an adjustment in operations to the difficult postwar conditions.

"An examination of the fisheries estimates for 1948-49 will show that they contemplate outlays of $6,413,810. In round terms, that is an increase of almost $1,190,000 over 1947-48.

"The basic long-run activities of the Department and its scientific branch, the Fisheries Research Board, are the development of our fisheries resources and, secondly, the improvement in the processing of fish products and their distribution to market. These objectives are sought through a number of different lines of action. Development includes, for instance, the search for new fisheries on both coasts and in the Arctic, programs for increasing the yield of established fisheries like Atlantic lobster and Pacific salmon.

"Similarly, improvement in distribution of products is not a single operation of one particular kind. It includes, among other things, new techniques of catching and processing, like new smokers and dryers, new refrigerated cars for the railroads, to mention only a few. In addition, there is extensive research and its application in evolving an efficient system of grading and inspection. I think it is essential to fisheries progress that the Department and the Research Board should concentrate a very large part of their efforts on this field of quality control.

"A share of the over-all increase in the estimates is traceable to an increase of $141,000 in the educational extension vote. It is explained, in part, by the decision to place fisheries exhibits in some of the larger fairs, so that popular interest in the fisheries and their products may be widened. Under this vote, special motion picture films for instructional and perhaps other purposes will also be made.

"The market outlook for 1948 is generally sound, but the products of the fishing industry have to offer value for cost right to the consumer's table. This means a constant striving for lower costs and better qualities from the fishing vessel to the housewife. The Department's work is extending along that whole front, from its biological studies, its research into methods of preventing fish spoilage, its extension of economic study into the marketing of fish, the educational work being undertaken in consumer services, and the extension of inspection for quality improvement. In short, the work of the various units is integrated into a program that should be considered as a whole.

"Canada has great fisheries resources on both coasts, in the inland provinces, and, as we have recently been finding out through research, in the far north as well. The work of the Department and the Board is increasing in all these areas. It is important to the nation that we see to it that the work is done as effectively and as rapidly as possible."

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LOBSTER: The peak of the Canadian lobster season is reached in May, and the combined May and June catches normally amount to two-thirds of the annual total.

Present trends indicate a total catch of at least 30,000,000 pounds in 1948, according to the Canadian fisheries periodical, Trade News. Up to the present, the utilization pattern shows no significant deviation from that of the last year or two. About 50 percent of the catch has been canned, 10 percent has been used for the production of fresh meat, chilled or frozen, and the remainder marketed in the live state. If the pattern of previous years for the fishery as a whole continues to be followed, the proportion disposed of in the live state will probably increase during the later months of the season and the proportion utilized for canning will decrease. A pack of approximately 45,000 cases of canned lobster is thus indicated for the current year.

WHALING: Whaling is under way on the Canadian Pacific Coast for the first time since 1943, and, at mid-July, 80 whales had been taken. This compares with 91 whales for the whole season in 1943. Moreover, the catch thus far may actually be less than what is potentially possible. The catchers are restricted to three whales per day, because of limited plant capacity. It is reported that this number is attained without difficulty. Most of the whales being taken this year are humpbacks, with a few finback and sei whales. A new development is the utilization of whales for the production of fresh chilled meat. Trial offerings of this product on West Coast markets met with favorable initial response.

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MANITOBA WINTER FISHING--1947-48 SEASON: The total catch for the winter fishing season in Manitoba (December 1, 1947 to March 15, 1948) amounted to 17,368,000 pounds, valued at $2,063,914, according to the June 1948 issue of Monthly Review of Canadian Fisheries Statistics. Pickerel (yellow pike) was the leading species (4,752,800 pounds - value, $950,586); followed by sauger (1,789,200 pounds - value, $319,301); and whitefish (2,153,300 pounds - value, $248,311). The marketed wholesale value of this catch was $2,828,870.

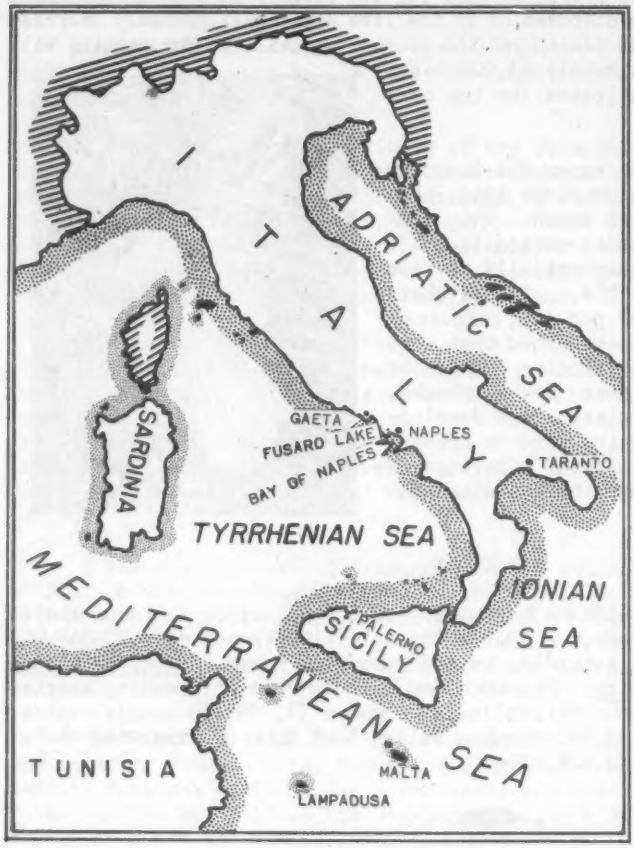
Italy

NAPLES FISHING INDUSTRY: Economic Importance: The Naples fishing industry, of considerable economic importance to the city, provides part of the local demand for fresh fish and gives employment to about 8,000 to 10,000 people. The wholesale value of the fish caught annually is estimated at about $1,750,000 to $3,500,000. The individual income of fishermen is small by American standards, averaging less than $1,000 a year, but because of the number of people involved, their gross earnings are an important factor in the economic activity of Naples, according to the American Consulate General at Naples.

Fishing Vessels and Methods: The fishing fleet consists of 590 small boats with engines up to 60 horsepower (many of these are sailboats with auxiliary motors) and 15 vessels with engines of over 60 horsepower. In addition, 2,000

unregistered and unlicensed small rowboats are used for fishing with nets and lines in the Bay of Naples.

The small motorboats usually fish only in the Bay of Naples and surrounding islands. Some of the larger boats fish along the coast as far north as Gaeta, as far south as Sapri and along the North Coast of Sicily from Cape Orlando to Palermo. While the quality of fish obtained in the Bay of Naples is good, the quantity available is usually not large and any boat which is large enough goes to a fishing ground outside the Bay.



The larger vessels, of which there are several with about 100 horsepower, three of 150 horsepower, two of 200 horsepower, and one of 300 horsepower, usually fish in a bank running between Tunisia and south of the islands of Lampadusa and Malta. They are gone from port about two weeks and they carry ice. The 300 horsepower vessel, which was recently completed, is the only one with mechanical refrigeration. None of the vessels freeze their catch nor do any salt, dry, or otherwise preserve the fish.

The Naples fishing fleet is able to supply no more than about 30 to 40 percent of the local demand for fresh fish. The balance comes from the Adriatic Coast of Italy and from Sicily.

With 2,000 rowboats used for fishing in the Bay of Naples, plus about 50 small motor auxiliary boats, the grounds are crowded and more vessels can be used for fishing locally only when there is an abundance of fish to be caught.

On the largest vessels, in accordance with an agreement with their union, fishermen are employed on a share basis. The owner of the vessel receives 25 shares and provides equipment and food. The captain and chief engineer each receives two shares and the crew receives one share each. The average catch for a vessel with an engine of 120 horsepower is about 4,100 to 5,100 pounds on a trip lasting about 12 days to 2 weeks. This gives each member of the crew about $21 to $25 net income a trip. When fishermen are hired on a wage basis, they receive

about $26 to $35 a month plus food. Some of the small boats are owned by several fishermen who fish and divide the profits in accordance with their investment.

In the Bay of Naples, fishing is with both nets and lines, mostly the former. Some of the fishing is with nets from the shore with men in rowboats placing the nets and people on shore pulling them in. Another method is to place a net around a school of fish and then draw it into a boat. This method is sometimes used at night with an artificial light to draw fish into the net. Anchovies and sardines are usually caught with gill nets. Outside the Bay of Naples, most of the fishing is by trawling.

The equipment used in fishing out of Naples is practically all made in Italy. Hemp for nets produced in Italy costs about $380 to $475 for a net of 274 to 360 pounds, and it costs about $350 extra to have a net made. Vessels cost about $175 a gross ton, and engines about $85 per horsepower.

ITALIAN FISHING VESSELS

Amount and Kinds of Fish Caught: There is no statistical record of the amount of fish caught by the Naples fishing industry, but it is estimated that about 1,217,000 to 1,521,000 pounds a year are caught by local fishermen with sailboats and motor powered vessels, and sold on the municipal wholesale market. It is also estimated that an equal amount, and possibly more, is caught by fishermen in rowboats in the Bay. The latter usually sell their fish directly to retailers and consumers. It is believed that they get an average of at least 101 pounds a month for each rowboat, 202,900 pounds a month in all during the period of year when they can fish. Allowing for periods of unfavorable weather when fishing in the Bay is impossible, especially from November through January, they should be able to catch from 1,521,500 to 2,028,600 pounds a year.

In summer, the principal fish caught in the Bay of Naples and nearby are sardines and anchovies. Fishing is usually carried on at night with artificial lights, and under favorable conditions and on a moonless night (when moonlight does not compete with the artificial lights) as much as a ton of these fish may be caught with a small boat. Other fish caught in the Bay include gray mullet, red mullet, mackerel, perch, cod, sea bass, ray, and octopus. The latter are caught at night with artificial lights and spears. Similar fish are caught off the North African Coast except that sardines and anchovies are less abundant there.

Marketing: Fishermen are supposed to dispose of their fish on the Naples wholesale market, which is controlled by the municipality and where commission agents' fees and other expenses amounting to 10.1 percent are paid by sellers. In addition, a municipal consumption tax of about 2 percent to 6 percent, depending on quality, is levied on fish sales and comes out of the price received by the seller. As the municipal market provides the only means of disposing of large quantities of fish, it is used by the most important fishers for disposing of their catch and for the sale of fish coming in from the Adriatic and from Sicily. Retailers come to the market each morning to buy the fish they estimate they will need for the day. The retail markup is supposed to be fixed in relation to the wholesale price, but it is reported that retailers evade this control. In order to maintain retail prices as prescribed by regulations, the municipality issues special licenses to one fish seller in each of the principal food markets who is supposed to sell at legal prices. This plan has not been successful.

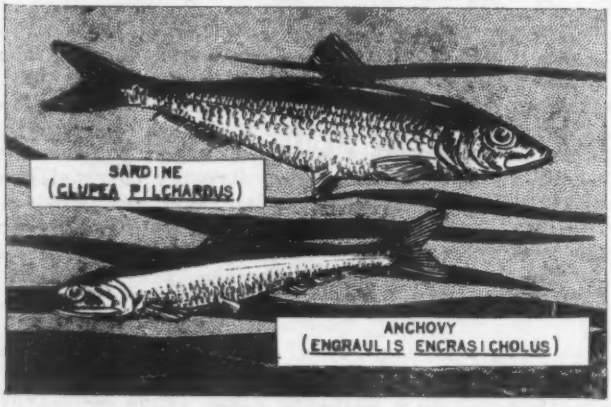
The fishermen who evade the municipal wholesale fish market sell their catch direct to retailers, to the mutual profit of both, and sometimes direct to consumers. Such fishermen include practically all those who fish from rowboats and many of the owners of small sailing vessels with motor auxiliaries.

Consumption of Fresh Fish: The amount of fresh fish sold to the Naples wholesale market has been as follows during recent years:

1947	1946	1938	1937	1936
lbs.	lbs.	lbs.	lbs.	lbs.
6,086,000	6,492,000	6,999,000	6,796,000	6,796,000

About one-fifth of the foregoing represents fish caught by Naples fishermen, most of the rest coming from Sicily and Italian ports along the Adriatic. These figures do not include the fish disposed of outside of the municipal market. Taking this into consideration, the estimated annual consumption of fresh fish in Naples is about 8,114,000 to 10,143,000 pounds or about 17.6 to 22 pounds per person per year.

Dried, Salted, and Frozen Fish: Dried and salted cod imported from Scandinavian countries, Iceland, and Canada, are consumed in important quantities in Naples and are cheaper than locally-caught fresh fish. They are sold in special stores which deal only in such fish and also in grocery stores. The amount of salted and dried fish sold in Naples in 1947 was 2,739,000 pounds as compared with 2,536,000 pounds in 1938.



An Italian company, which markets frozen fish all over Italy, both what it catches itself and what it imports, has eight retail outlets in Naples. The latter sell in all about 30,400 pounds a month. This is small compared with the amount of fresh fish sold in Naples, but the frozen fish industry is comparatively new and is growing. So far, frozen fish have not been popular, despite being considerably less expensive, because the public prefers fresh fish.

Oysters and Clams: Oysters and several species of clams are artificially raised in small quantities in Fusaro Lake near Naples. This is a small salt water lake connected with the Bay of Naples by a canal. The local shellfish industry is much too small for the needs of the Naples market and most of such fish consumed in this region come from Taranto.

Prices: The following table shows approximate average wholesale prices of six important fresh fish caught near Naples during the first two and a half months of 1948 as compared with average prices in 1938. The present retail markup, according to municipal regulations, is supposed to be no more than 1.7 cents per pound for fish selling up to 17.4 cents per pound and no more than 22 percent for those selling for over 17.4 cents per pound.

Wholesale Fresh Fish Prices - Naples

	First 10 Weeks 1948 Average ¢ per lb.	1938 Average ¢ per lb.
Gray Mullet	.44	.17
Red Mullet	.36	.14
Sea Bass	.64	.31
Octopus	.25	.21
Ray	.14	.06
Anchovy	.08	.08

Current prices of fresh fish are approximately 60 times prewar, or about the same as the rise in the cost of living in this region. Salted and dried cod are retailing for about 24 cents to 32 cents per pound and mussels are selling for about 9½ cents to 10 cents per pound retail.

Frozen fish are being retailed as follows:

Wholesale Frozen Fish Prices - Naples

	¢ per lb.		¢ per lb.
Fillet of Codfish	.30	Dentex	.23
Small Codfish	.15	Sole	.28
Mackerel	.13	Salmon (without head)	.20
Squid	.30	Sea Bass	.28

Governmental Aid: The Italian Government is assisting the fishing industry by grants for the construction of new vessels and by special interest rates on bank loans for the same purpose. For the 300 horsepower fishing vessel with 112 tons gross weight recently built in Naples, the Government paid $14,600 and gave an exemption from taxes amounting to $697. For loans from banks toward the building of fishing vessels, the rate of interest is 10½ percent of which the Government pays 2 percent. As a guarantee, the banks require a mortgage on the vessel and also require that the vessel be insured. As the insurance rates are high, the owner of the 300 horsepower vessel mentioned above has to pay a premium of $2,435 on a policy of $69,565.

Japan

CROSSBREEDING OF OYSTERS: The marine laboratories in Onagawa, Hokkaido, and Hiroshima are crossbreeding oysters in an attempt to develop an ideal commercial oyster, according to a recent release of the Natural Resources Section of the Supreme Commander for the Allied Powers in Japan. The oyster now raised in Hokkaido is too large and has an inferior flavor. It has, however, an early spawning period, which allows time to fatten the oyster for market, after breeding it. The Hiroshima oyster has a better size and flavor but spawns late. These two oysters were crossbred three years ago, and results are anticipated this summer.

Japan and Korea

FOOD CONDITIONS: The collection and distribution of food in Japan is more rigidly controlled than in any other country in the world, according to a "Report on Food Conditions in Japan and Korea, and Factors Affecting Far Eastern Procurement" made public by the Department of the Army. All significant food products are subject to rationing controls. Even fresh vegetables and fish are rationed. An intensified fish and vegetable rationing program, instituted in December 1947 in Japan has resulted in quite effective control considering the special problems encountered in rationing perishable foodstuffs.

The present Japanese staple food ration--cereals and potatoes--equals 1246 calories per person per day for normal consumers and provides the major source of calories in the Japanese diet. It is supplemented by rations of miso (soybean paste), shoyu (soy sauce), and edible oil which currently provide an additional 50-60 calories daily. On the average, the rations of fish and vegetables provide 100-150 calories daily, making a total official ration level of about 1450 calories. This is below a minimum subsistence diet, so there is intense pressure for consumers to supplement the official ration.

Japan's production of fish, the largest in the world, is highly important as it provides the major source of animal protein in the Japanese diet. Considerable progress has been made in restoring fish production to prewar levels, but the deterioration of fishing equipment and the extreme shortage of replacement supplies has created a serious situation in which Japan is faced with a drop in fish production of possibly 25 percent unless minimum requirements of fishing gear are obtained. Recent procurements of hard fibers and cotton will help to alleviate the acute shortage of nets and rope, but these are recurring requirements and a high priority must be given to the procurement of these items on a continuing basis.

Fishing supplies are extremely short in Korea. As in the case of Japan, the requirements are recurring and must be adequately provided for in the 1949 fiscal year budget. Boats available for fishing are also inadequate.

The report recommends that maximum emphasis should be placed on the procurement of fertilizers, insecticides, and fishing supplies for Japan and Korea.

Mexico

SHRIMP FISHING IN GUAYMAS: With commercial fishing at a standstill, business in general has dropped to the customary low point of summer in the Guaymas Consular District. The major activity is the repairing of the fishing fleet's boats and equipment, according to a consular report from Guaymas.

The fishing fleet prepares for the September 1 opening of bay shrimping, and the October 1 season for deep-sea shrimp fishing. The shrimp season just completed marked up higher production figures than in the previous year, but the catch per unit was smaller. Shark fishing is virtually over until February.

Norway

NEW NORWEGIAN GALAPAGOS EXPEDITION: Twenty Norwegians are taking part in a new Norwegian expedition to Galapagos, Ecuador, where they will set up and start a fishing and canning industry, according to the Royal Norwegian Information Service. There were 650 applicants for the expedition which went to Las Palmas and from there through Panama.

Republic of the Philippines

CHALLENGE OF PHILIPPINE FISHERIES: The first group of Filipino fisheries trainees to be sent to the United States for a year's training in American fishing and fish-handling techniques, under the fisheries program authorized by the Philippine Rehabilitation Act of 1946, returned to the Philippines recently following completion of their studies in America, according to a recent press release of the Philippine Bureau of Fisheries and the U. S. Fish and Wildlife Service.

PHILIPPINE DRIED FISH

These trainees--18 in number--left the Islands in April of last year. While in the United States, they underwent intensive practical training in the various phases of fishery work. In addition, six trainees were sent to different American institutions of learning for instruction in the scientific aspects of fisheries.

They have come back with definite ideas and plans as to what they will do and what should be done locally in order to develop to best advantage the marine resources of the Philippines.

Some of the trainees are planning to carry their studies further along the lines they have studied, some have entered the Government in order to apply their fisheries knowledge, and some would like to go into the fishing business, if there are people willing to back them in the introduction of modern methods of fishing in the Islands.

On the subject of Philippine marine resources development, the trainees are generally agreed on the following points:

1. That a thorough scientific survey of Philippine marine resources and potentialities should be made, aimed at determining the best methods of development,

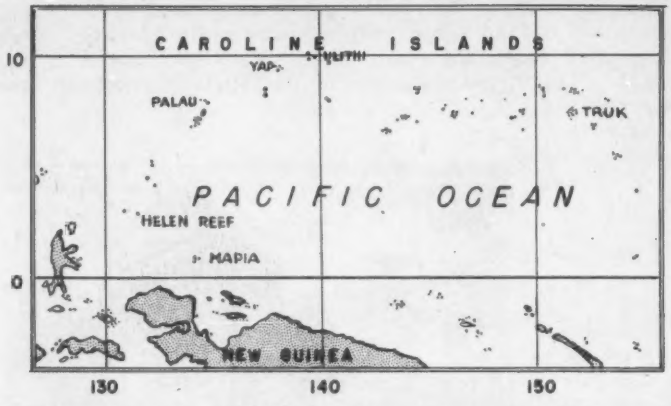
2. That more adequate and strict conservation laws should be enacted and enforced to safeguard the piscatorial wealth of the country,

3. That the Filipinos should be enlightened on the wise use of modern fishery methods, so that they can reap greater profits from their investments,

4. That the Philippine Government should arouse public enthusiasm in fisheries as an important factor in the food supply of the Philippines.

Western Caroline Islands

POTENTIAL TUNA AND SKIPJACK FISHERIES: The following is based on a brief survey of the Western Caroline Islands conducted by the M/V Oregon between April 25 and May 22, 1948, according to a report by O. R. Smith, Aquatic Biologist of the U. S. Fish and Wildlife Service. The survey included the islands of Ulithi, Yap, the Palau group, and a southward leg to Helen Reef (Lat. 2° 52' N, 131° 45' E). Most of the period of the survey was taken up with scouting or fishing for live bait around the many small islands south to Koror, in the Palau group.



Fish suitable for live bait are abundant along most of the tortuous shorelines of islands south of Koror. Jagged rocks and coral limit the seining areas but, nevertheless, schools of bait amounting to several hundred scoops can be found and seined on numerous small sand beaches scattered through the islands.

The fish seen were an atherined, like the Hawaiian "Iao", 2½ to 5 inches long, a flat herring of about the same size, and a smaller round herring. The "Iao" was the most common along the beaches. The flat herring also occurred along the beaches, but it proved very wild and very little was seined. The "Iao" is also wild but can be seined more easily than the herring. In making a set, stealth seemed to be more effective than speed. The small round herring was more often caught under a light at night. It was not caught in large quantities but more thorough trials, especially in shallow water, might bring up a good supply of these fish. Where fishing with lights works, it offers great economy in man hours.

The natives of Koror stated that "Iao" was "number two bait" for the Japanese. "Number one bait" was apparently a small translucent anchovy, but none of these were found.

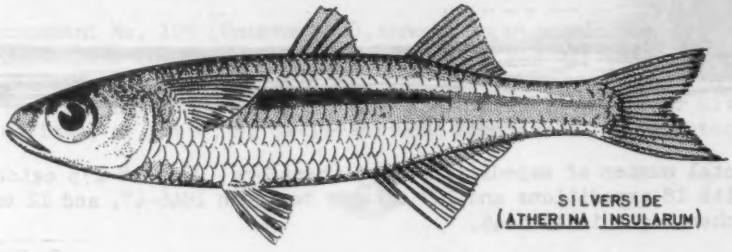
The bait fishes are relatively delicate, but after numerous failures it was found that they can be kept alive in a modern bait tank for several days or a week. Most of the mortality seems to result from mechanical injuries, at least partly due to their habit of continually pushing against the seine. Because of this habit, bait should be transferred to a receiver, and thence to the vessels' tanks as rapidly as may be consistant with careful handling. Once in the bait tank, they did not injure themselves further. It is recommended that the bait

be handled with buckets and never lifted out of water, following the Hawaiian-Japanese methods.

Bait was not found in deep water suitable for a West Coast lampara.

Both the "Iao" and round herring tended to stay bunched and close to the vessel when thrown out as bait.

Schools of yellowfin tuna and of oceanic skipjack were sighted under birds along most of the islands. They seemed to be most abundant along the southeast side of the Palau reef, and around Helen Reef. Tuna were seen with porpoises only once. All of the fish seen were rather wild and never more than 5 or 6 from any one school were caught. That particular habit, however, must either be seasonal or something that can be overcome with local experience because it is known that the Japanese had a sizable live bait fishery in the same region. The natives state that the Japanese live bait boats did not bother to go out in May because the tuna "were having babies" and would not bite. It was true that some of the tuna and skipjack caught were in a spawning condition.



SILVERSIDE
(ATHERINA INSULARUM)

Japanese fishery statistics indicate that the Japanese skipjack fishery in the Palau area was expanding rapidly until 1937, when 13,774 metric tons were caught.1/ After that, pressure from the rival fishing interests resulted in a limitation on the number of boats allowed in the Palau area, so there is no evidence that the limit of profitable production had been reached.

The impression is prevalent that only the Japanese, with their skill and cheap labor, can make tuna and skipjack fisheries pay from Hawaiian waters westward. The exploratory work of the Oregon would seem to have disproven at least a part of that impression. Live bait was successfully fished with a crew of seven or eight men and the bait was kept alive for about a week. The Japanese in Saipan used bait tanks which depended upon holes through the hull for circulation of water, and with these tanks they could not keep bait alive overnight.2/ Natives at Koror reported that the Japanese used the same methods around the Palaus.

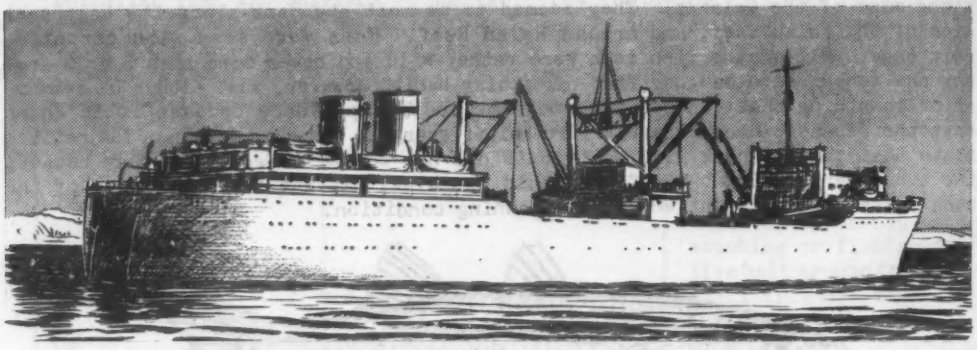
A tuna and skipjack fishery probably can be developed in the Western Caroline Islands.

The type and size of vessel that should be used to develop the fishery will depend on the logistics of the area. A relatively small vessel would seem to have an advantage in coming in close to the bait grounds, but a larger tuna clipper type might be necessary if the fish must be carried outside the Palaus. Fishing vessels should have bait tanks provided with pumped circulation.

1/ Fishery Leaflet 297, U. S. Fish and Wildlife Service.
2/ Fishery Leaflet 273, U. S. Fish and Wildlife Service.

International

WHALING, 1947-48 SEASON: The number of whaling expeditions in the Antarctic this season was the greatest since before the war, according to the Australian Fisheries Newsletter, June 1948. Norway sent 9 factory ships with 81 catcher boats; Britain, 4 factory ships, including 1 South African, with 45 catchers; Japan, 2 factory ships, 12 catchers; Holland, 1 factory ship, 8 catchers; Russia, 1 factory ship, 8 catchers. In addition, there were 3 shore stations--1 Norwegian, 1 British, and 1 Argentine--with 21 catcher boats.



MODERN WHALE FACTORY SHIP

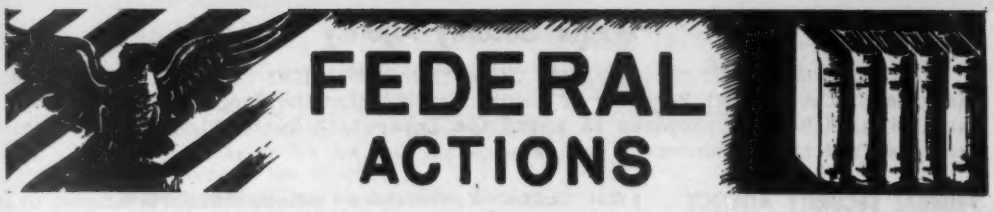
The total number of expeditions was, therefore, 20 with 175 catcher boats, compared with 18 expeditions and 147 catcher boats in 1946-47, and 12 expeditions and 93 catcher boats in 1945-46.

Whaling (except of sperms and from shore-based stations) ceases when the catch by all expeditions reaches 16,000 blue whale units, equal to about 300,000 tons of oil. As oil has risen by about $40 a ton to about $440, the Antarctic catch is now worth about $132,000,000.

THE OYSTER AND THE OYSTER INDUSTRY IN THE UNITED STATES

Under natural conditions, oysters are found in brackish waters in depths ranging from half way between tide marks to 40 and 50 feet. Oysters can grow even in deeper water, but no commercially important beds occur below 40 feet. They are well adapted to withstand considerable fluctuations in temperature and salinity of water, thriving in the bays and estuaries where environmental conditions frequently change. In the Gulf of Mexico and on the flats of the inshore waters in southern States, the temperature at oyster bottoms often reaches or even exceeds 90° F.; whereas, in the northern States, nearly freezing temperatures occur every winter. Their tolerance to salt content is also very great. Natural oyster beds are usually located near river mouths and in bays where the salt content of the water is greatly reduced.

--Fishery Leaflet 187



Civil Service Commission

CIVIL SERVICE EXAMINATIONS: The Civil Service Commission announced on August 10, examinations for Agricultural Research Scientist, grades P-2 to P-7, with salary ranging from $3,727 to $8,509 per year. Included in the examination are several options, such as Biology (Wildlife), Fisheries Research Biology, and Bacteriology. Applications will be accepted until further notice by the Civil Service Commission at Washington 25, D. C. Applicant will be rated entirely on experience and education.

Announcement No. 109 (Unassembled), announcing an examination for Agricultural Research Scientist, which includes the options of Biology (Wildlife), Fisheries Research Biology, and Bacteriology, and the necessary application forms can be obtained from any first- or second-class post office, the U. S. Civil Service Regional Offices, or the U. S. Civil Service Commission, Washington 25, D. C.

Economic Cooperation Administration

LOAN TO ICELAND: The authorization of the first loan under the Economic Cooperation Act was announced on July 16. The signing of the first loan agreement under the provisions of the Economic Cooperation Act of 1948 was then announced on July 22 jointly by the Economic Cooperation Administration and the Export-Import Bank of Washington. The loan is to the Government of Iceland and is for a total not to exceed $2,300,000.

The loan is to assist Iceland in financing the cost of United States machinery, equipment, and supplies for increasing production and processing of herring oils and related products, as a part of the European Recovery Program. It will bear interest at 3 percent per annum and is payable in 10 years. Principal payments are to start approximately three years from the date of the first advance under the credit. The credit is available until June 30, 1949.

The catch and processing of fish products is a mainstay of Iceland's domestic economy and exports of fish products account for over 90 percent of total exports. The products which are being financed under the credit will help Iceland increase the output and export of herring oil and herring meal, especially to ERP countries. Iceland's herring oil will contribute to the relief of present and prospective acute shortages of edible oils. Herring meal and byproducts will provide feed for Europe's poultry industry, as well as fertilizer to increase crop production.

Federal Security Agency

PROPOSED AMENDMENT OF INTERSTATE QUARANTINE REGULATIONS FOR SHELLFISH: Notice was given in the Federal Register of August 4, 1948, that the Surgeon General of the Public Health Service proposes to amend the Interstate Quarantine Regulations. Excerpts from the announcement follow:

FEDERAL SECURITY AGENCY

Public Health Service

[42 CFR, Part 72]

INTERSTATE QUARANTINE

NOTICE OF PROPOSED RULE MAKING

Notice is hereby given that the Surgeon General of the Public Health Service, with the approval of the Federal Security Administrator, proposes to amend, as indicated below, the Interstate Quarantine Regulations contained in Part 72, Title 42, Code of Federal Regulations.

1. The proposed amendments would add to Subpart C a new § 72.24 to read as follows:

§ 72.24 *Shellfish.* A person shall not offer for transportation, or transport, in interstate traffic any shellfish handled or stored in such an insanitary manner, or grown in an area so contaminated, as to render such shellfish likely to become agents in, and their transportation likely to contribute to, the spread of communicable disease from one State or possession to another.

2. It is also proposed to substitute the term "shellfish" for the words "raw oysters, clams, and mussels" at the end of paragraph (a) of § 72.164 of Subpart H; to rephrase the initial portion of paragraph (f) of § 72.165 to read, "Shellfish purchased for consumption on any conveyance shall * * *;" and to add the following definition as paragraph (r) of § 72.1 of Subpart A:

(r) *Shellfish.* Shellfish means any fresh, frozen, or incompletely cooked oysters, clams, or mussels, either shucked or in the shell, and any fresh, frozen, or incompletely cooked edible products thereof.

[SEAL] LEONARD A. SCHEELE,
Surgeon General.

Approved: July 29, 1948.

OSCAR R. EWING,
Federal Security Administrator.

[F. R. Doc. 48-7037; Filed, Aug. 3, 1948; 9:08 a. m.]

In this connection, a hearing was held on August 19 in Washington at which interested persons, either in person or by mail, were given an opportunity to present their views in regards to the proposed amendment.

Interstate Commerce Commission

INCREASES IN RAILROAD FREIGHT RATES AND CHARGES: Permanent increases in freight rates and charges were granted American railroads in a report and order issued by the Interstate Commerce Commission on July 27, 1948. The order makes permanent the increased freight rates and charges described in the report, which are the Commission's final conclusions, as the results of proceedings under its Ex-Parte 166--Increased Freight Rates, 1947.

In general, the increases authorized are similar to the temporary increases granted on April 13, 1948, except that a reduction was made from 25 percent to 22½ percent between zone I of western trunk-line territory and western territory other than zone I of western trunk-line territory. Since this is the final decision in this matter, increases in rates and charges which apply to the fishery industries are given in detail as follows:

> Basic freight rates and charges in effect prior to ExParte 166 (July 3, 1947) may be increased upon 15 days notice to the Commission and the public.

Territory	Actual Increases	Increases Requested by Railroads
	Percent	Percent
Within eastern territory.....	30	41
Within southern territory.....	25	31
Within zone I of western trunk-line territory	25	31
Within western territory other than zone I of western trunk-line territory.....	20	31

Territory	Actual Increases Percent	Increases Requested By Railroads Percent
Interterritorially between southern and western territories and between those territories on the one hand and eastern territory on the other.....	25	41
Between western territory, other than zone I of western trunk-line territory, and zone I of western trunk-line territory.....	22½	31

Limitations to the aforementioned increases were made by placing maximum increases on certain fishery commodities, as follows:

Oil, fish or sea animal, not edible nor medicinal - maximum 20 cents per 100 pounds.

Shells, oyster, clam, coquina or mussel, whole, broken, or ground, in open cars with the lading not protected by tarpaulins or similar coverings - maximum 1½ cents per 100 pounds. In closed cars or in open cars with the lading protected by tarpaulins or similar coverings - maximum 6 cents per 100 pounds.

Fertilizer and fertilizer materials - maximum 8 cents per 100 pounds.

Rates and charges for protective service published in Perishable Protective Tariff No. 14, Agent Quinn's I.C.C. No. 25, may be increased by 15 percent.

The increases as requested by the railroads would have meant additional costs of approximately $26,000,000 per annum for the fishery industry. The actually authorized increases mean additional costs of approximately $16,000,000 per annum. Protests against the increased rates were made by the Department of the Interior, the Department of Agriculture, trade associations, individual shippers, and State agencies.

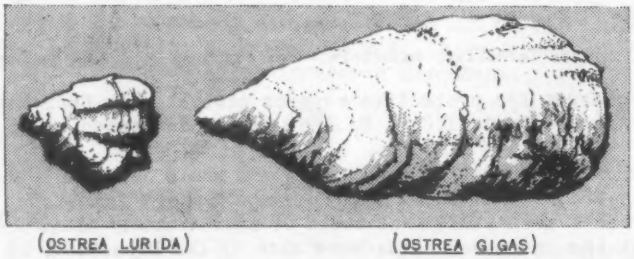
U. S. Coast Guard

INCREASES OCEAN WEATHER STATIONS: During the fiscal year 1949, the U. S. Coast Guard plans to augment the ocean weather stations from a present total of three to a total of nine and one-half, according to the July 1948 issue of the Coast Guard Bulletin. The three now in operation include two in the Atlantic Ocean and one in the Pacific Ocean. The nine and one-half stations will include seven and one-half in the Atlantic and two in the Pacific. An explanation of the one-half station is that the Canadian Government will operate the station one-half the time while the United States, through the Coast Guard, will operate the station the other half of the time. Arrangements are being made whereby the Coast Guard will acquire 17 additional cutters which are needed to man all of the stations full time.

Some confusion exists regarding the names of the vessels and stations within the weather station program. In order to gain consistency in usage, it has been suggested the following be used:

Ocean Station Vessel: A vessel specifically equipped to man an Ocean Weather Station.

Ocean Weather Station: A 210 miles square orientated with its sides north-south and east-west, whose center is the designated station and whose area is covered by the position indicating radio beacon grid.



(OSTREA LURIDA) (OSTREA GIGAS)

PLANTING AND MARKETING OYSTERS IN THE PACIFIC NORTHWEST

On the Pacific Coast, two species of oysters form the basis of the industry (Ostrea lurida, the Olympia or native oyster; and Ostrea gigas, the Pacific or Japanese oyster). The Olympia oyster is the small native species, whose habitat extends from British Columbia to California. It is roughly circular in outline and does not attain any great size; and 2 inches in diameter is a fair-sized specimen. This species is cultivated in Puget Sound where, as shucked oysters, as many as 1,600 to 2,000 meats are required to make a gallon, which sells for about $12, wholesale. The Pacific oyster is a species introduced from Japan, sometimes reaching a length of 12 inches or more. The market grades may run as low as 80 meats to the gallon, while for the small, or C grade, the count is 140 or more per gallon. The shell of a good specimen is longer than it is wide, narrower at the hinge end, and broad at the opposite end. An average marketable specimen may be 3 to 4 inches long and 2½ to 3 inches wide. Some single oysters, when grown on a hard bottom under uncrowded conditions, are nearly circular in outline.

--Fishery Leaflet 52

Riches of the Sea

UNDER ACCEPTED PRINCIPLES OF EVALUATION AMONG BUSINESSMEN THE COMMERCIAL FISHERY RESOURCES OF U.S. IN 1946 HAD THE FOLLOWING VALUES:

TO FISHERMEN AND BOAT OWNERS	$ 4,743,750,000
TO MANUFACTURERS AND PROCESSORS	$ 1,320,263,000
TO WHOLESALERS OF FISHERY PRODUCTS	$ 1,707,614,000
TO RETAILERS OF FISHERY PRODUCTS	$ 2,023,728,000

TOTAL VALUE

$ 9,795,355,000

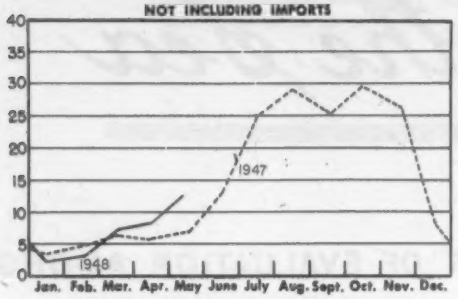
IF THE NATION HAD NO FISHERY RESOURCES THIS AMOUNT WOULD HAVE TO BE INVESTED AT 4% TO MAINTAIN THE 1946 EARNINGS OF THE MEMBERS OF THE FISHERY INDUSTRIES.

LANDINGS AND RECEIPTS

In Millions of Pounds

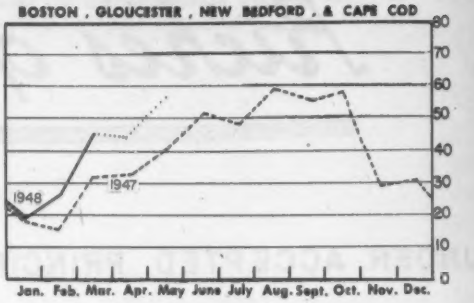
MAINE - LANDINGS

NOT INCLUDING IMPORTS



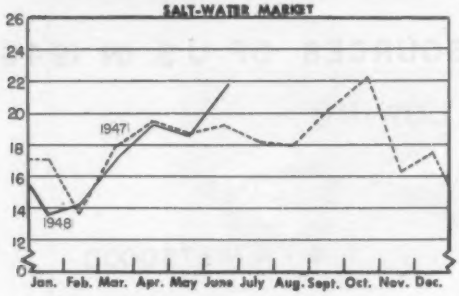
MASSACHUSETTS - LANDINGS

BOSTON, GLOUCESTER, NEW BEDFORD, & CAPE COD



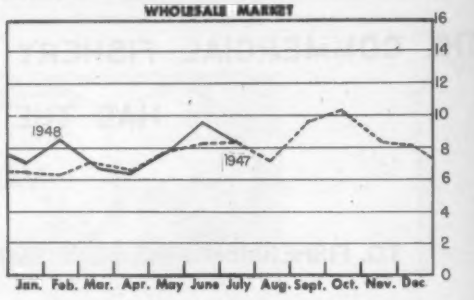
NEW YORK CITY-RECEIPTS OF FRESH & FROZEN FISH

SALT-WATER MARKET



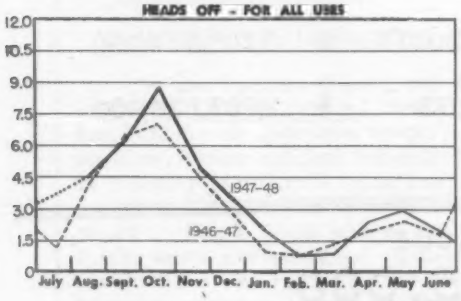
CHICAGO - RECEIPTS OF FRESH & FROZEN FISH

WHOLESALE MARKET



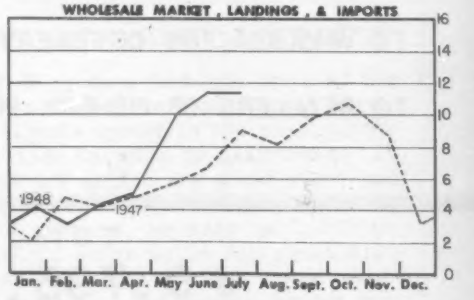
GULF - SHRIMP LANDINGS

HEADS OFF - FOR ALL USES



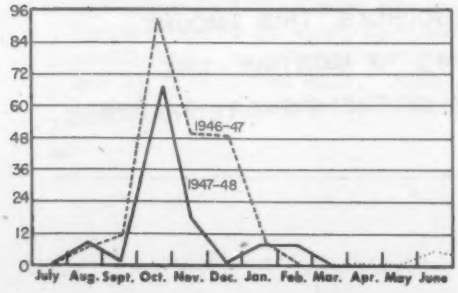
SEATTLE - RECEIPTS OF FRESH & FROZEN FISH

WHOLESALE MARKET, LANDINGS, & IMPORTS

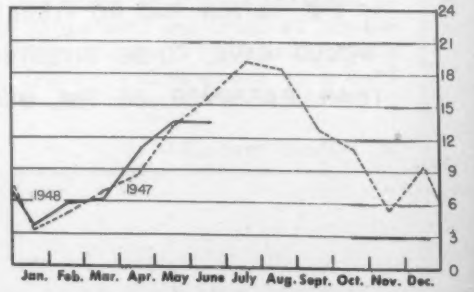


In Thousands of Tons

CALIFORNIA - PILCHARD LANDINGS



CALIFORNIA - TUNA LANDINGS

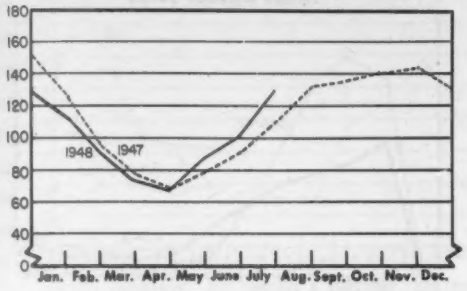


..... ESTIMATED

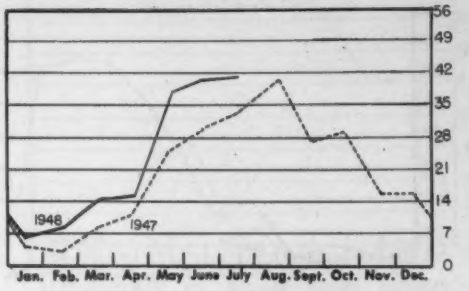
COLD STORAGE HOLDINGS and FREEZINGS of FISHERY PRODUCTS

In Millions of Pounds

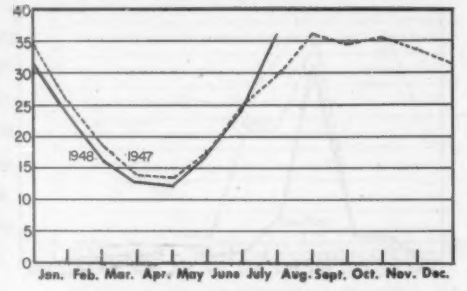
U.S. & ALASKA - HOLDINGS OF FROZEN FISH



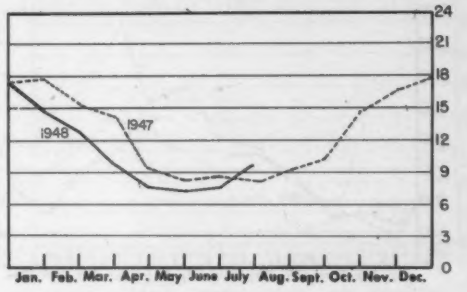
U.S. & ALASKA - FREEZINGS



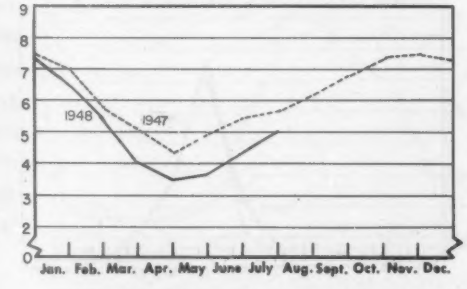
NEW ENGLAND - HOLDINGS OF FROZEN FISH



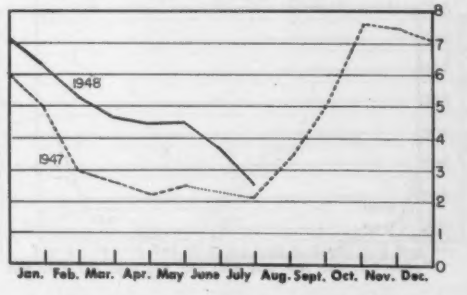
NEW YORK CITY - HOLDINGS OF FROZEN FISH



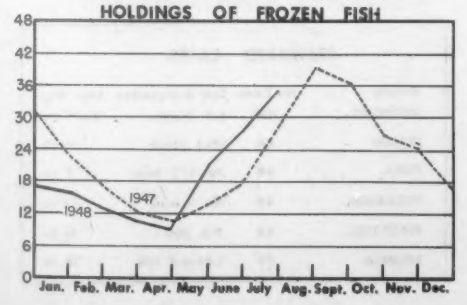
CHICAGO - HOLDINGS OF FROZEN FISH



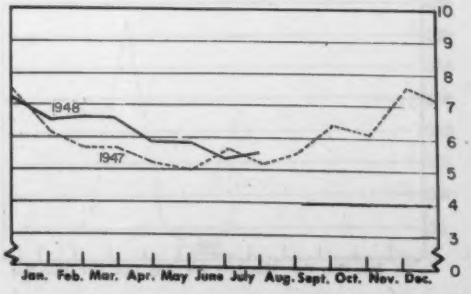
GULF - HOLDINGS OF FROZEN FISH



WASHINGTON, OREGON, AND ALASKA - HOLDINGS OF FROZEN FISH



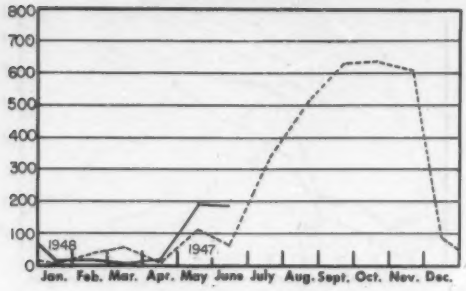
CALIFORNIA - HOLDINGS OF FROZEN FISH



CANNED FISHERY PRODUCTS

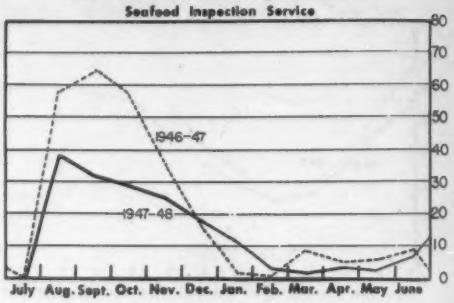
In Thousands of Standard Cases

MAINE - SARDINES, ESTIMATED PACK

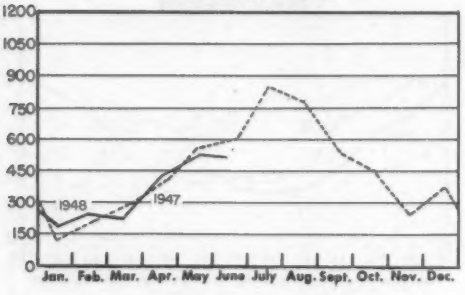


UNITED STATES - SHRIMP

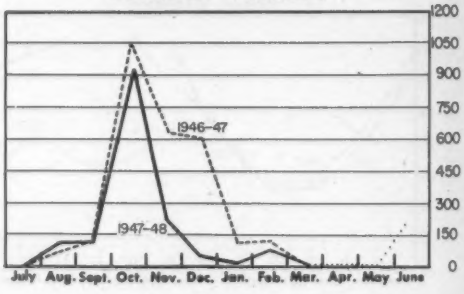
Plants under Food and Drug Administration Seafood Inspection Service



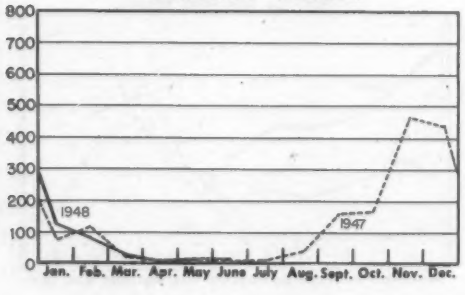
CALIFORNIA - TUNA



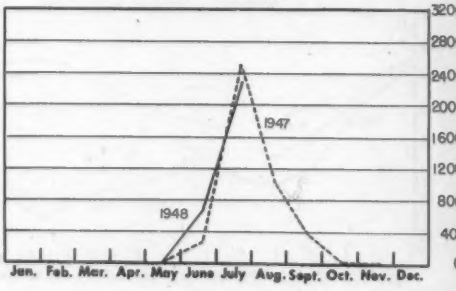
CALIFORNIA - PILCHARDS



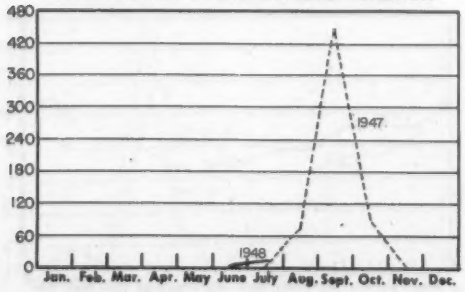
CALIFORNIA - MACKEREL



ALASKA - SALMON



WASHINGTON - PUGET SOUND SALMON



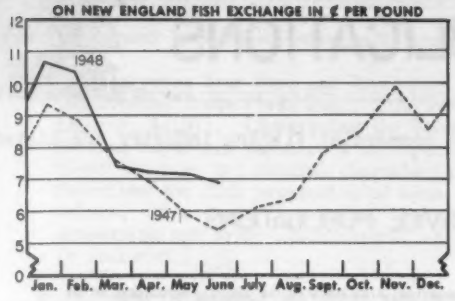
STANDARD CASES

Variety	No. Cans	Can Designation	Net. Wgt.
SARDINES	100	1/4 drawn	3 1/4 oz.
SHRIMP	48	No.1 picnic	7 oz.
TUNA	48	No. 1/2 tuna	7 oz.
PILCHARDS	48	No. 1 oval	15 oz.
MACKEREL	48	No. 300	15 oz.
SALMON	48	1-pound tall	16 oz.

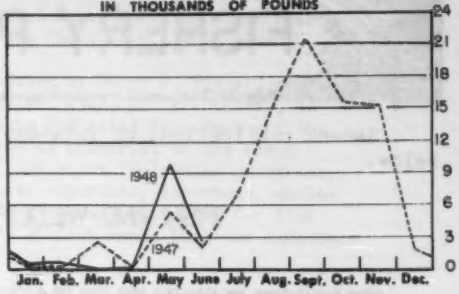
-----ESTIMATED

PRICES, IMPORTS and BY-PRODUCTS

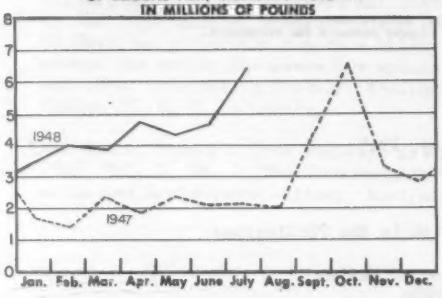
BOSTON - WEIGHTED AVERAGE PRICE
ON NEW ENGLAND FISH EXCHANGE IN ¢ PER POUND



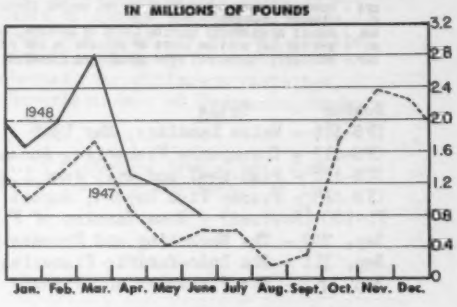
MAINE - IMPORTS OF SEA HERRING
IN THOUSANDS OF POUNDS



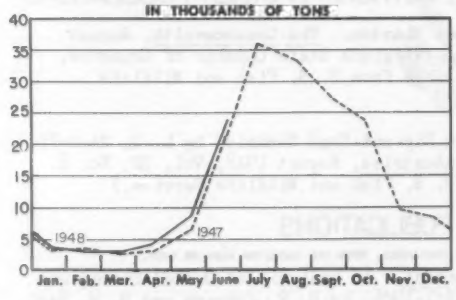
U.S. - IMPORTS OF FRESH & FROZEN FILLETS
OF GROUND FISH, INCLUDING ROSEFISH:-
IN MILLIONS OF POUNDS



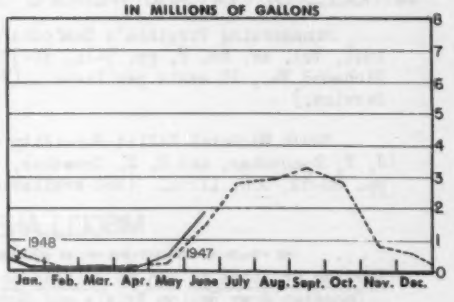
U.S. - IMPORTS OF SHRIMP FROM MEXICO
IN MILLIONS OF POUNDS



U.S. & ALASKA - PRODUCTION OF FISH MEAL
IN THOUSANDS OF TONS



U.S. & ALASKA - PRODUCTION OF FISH OIL
IN MILLIONS OF GALLONS



Recent publications of interest to the commercial fishing industry are listed below.

FISH AND WILDLIFE SERVICE PUBLICATIONS

THESE PUBLICATIONS ARE AVAILABLE FREE FROM THE DIVISION OF INFORMATION, FISH AND WILDLIFE SERVICE, DEPARTMENT OF THE INTERIOR, WASHINGTON 25, D. C. TYPES OF PUBLICATIONS ARE DESIGNATED AS FOLLOWS:

CFS - CURRENT FISHERY STATISTICS OF THE UNITED STATES AND ALASKA.
FL - FISHERY LEAFLETS.
MDL - MARKET DEVELOPMENT SECTION LISTS OF DEALERS, LOCKER PLANTS, ASSOCIATIONS, ETC.
SL - STATISTICAL SECTION LISTS OF DEALERS IN AND PRODUCERS OF FISHERY PRODUCTS AND BYPRODUCTS.
SEP.- SEPARATES (REPRINTS) FROM COMMERCIAL FISHERIES REVIEW.

Number	Title
CFS-416	Maine Landings, May 1948
CFS-417	Chesapeake Fisheries, Annual Summary, 1945
CFS-418	Fish Meal and Oil, June 1948
CFS-419	Frozen Fish Report, August 1948
FL-180 (Revised)	Home Canning of Fish
Sep. 210	The Marketing and Processing of Fish in the Philippines
Sep. 211	The Indo-Pacific Fisheries Council
Sep. 212	The Fisheries and Fishery Resources of Mexico

ARTICLES BY FISH AND WILDLIFE SERVICE AUTHORS IN OTHER PUBLICATIONS

"Conserving Virginia's Seafoods" by James Wharton. The Commonwealth, August 1948, Vol. xv, No. 8, pp. 9-11, 31-32, illus. Virginia State Chamber of Commerce, Richmond Va., 15 cents per issue. (Not available from U. S. Fish and Wildlife Service.)

"Curb Mackerel Fillet Rancidity with New Dip-and-Coat Technic" by L. S. Stoloff, J. F. Puncochar, and H. E. Crowther, Food Industries, August 1948, Vol. 20, No. 8, pp. 80-82, 208, illus. (Not available from U. S. Fish and Wildlife Service.)

MISCELLANEOUS PUBLICATIONS

THE FOLLOWING PUBLICATIONS MAY BE OBTAINED, IN MOST INSTANCES, FROM THE AGENCIES ISSUING THEM.

Feeding Problems in Man as Related to Environment. An analysis of United States and Canadian Army Ration Trials and Surveys, 1941-1946, by R. E. Johnson and R. M. Kark. Quartermaster Food and Container Institute for the Armed Forces, Research and Development Branch, Office of the Quartermaster General, Chicago 9, Ill., June 1946, 94 p., illus. with photos, tables, and graphs, processed. (Although this publication does not specifically mention fish and deals mostly with food and nutrition problems of peculiar interest to the armed forces, it also contains some food and nutritional data of general interest in both civilian and military life.)

A chart "Fishermen's and Yatchsmen's Chart Cape Cod to Newfoundland," 40 x 60 inches together with 36-page booklet, North Atlantic and Gulf of St. Lawrence Fishing Grounds by Albert Close, Ilford, London; distributed by Kelvin-White Co., 90 State St., Boston, 1948, $6.00. (This chart together with booklet describes and charts all the fishing banks in detail, giving probable weather conditions, kind of

bottom, and type of fish most likely to be found. Contains fishing banks information from the fisheries departments of the United States, Canadian, and French Governments.)

Maryland Commercial Fish Hatchery Operations 1946 and 1947, By Coit M. Coker, Educational Series No. 15. Chesapeake Biological Laboratory, Maryland Board of Natural Resources, Solomons Island, Md., June 1947, 14 p., with photos.

World Fisheries Year-Book and Directory 1948, edited by Harry F. Tysser. British-Continental Trade Press Ltd., 222, Strand, London, 1948, 288 p., illus., £1 (Approx. $4.03). (Supersedes the North Atlantic Fisheries Year-Book and the Herring Exporters Manual. A short, concise book on fisheries of the world. Gives the size and general characteristics of the catch in leading countries; describes the fish processing of each; and lists exporters, importers, wholesalers, canners and preservers, dealers in machinery and equipment for fish processing and trade associations. A glossary of fish names in seven languages is included.)

World Trade in Sponges, by A. H. Stuart, Industrial Series No. 82, Office of International Trade, U. S. Department of Commerce, Washington, D. C., 1948, 95 p., illus., with photos. (Covers all important phases of sponge industry. Points up the importance of sponges to American business; describes the serious decline in American production due to a blight; gives details of sponge production around the world; discusses how sponges are obtained, the different varieties, and other interesting facts.) Available from Superintendent of Documents, Washington 25, D. C., 30 cents.

"Less Waste, More Oil from Whales," article, p.3, in Fisheries Newsletter, June 1948, Vol. 7, No. 3, The Commonwealth Fisheries Office, The Department of Commerce and Agriculture, Sydney, Australia.

Processing -- Miscellaneous Service Division

Illustrator -- Gustaf T. Sundstrom Compositors -- Margaret C. Harris and Norma D. Loeffel

44547

OYSTER CULTIVATION

The origin of the oyster industry is lost in antiquity, but undoubtedly goes back to the use of these shellfish as food by primitive peoples. It is known that many centuries ago, the Romans were large consumers of oysters and that these people played an important role in the development of the industry. It is known, also, that the oyster was highly regarded as an article of food by the North American Indians; large mounds of oyster shells left by them may be found along our East Coast; one of them in Maine has been estimated to contain about 7,000,000 bushels of shells. The early American colonists were quick to realize the possibilities of using, as an important source of food, the vast quantities of oysters then available.

Although the cultivation of oysters has been practiced for centuries in other countries, it is only within comparatively recent times that it has come into extensive use in this country. Practically the entire oyster industry of Long Island and New England is now based on a "farming" procedure. Oyster farming is pursued to a limited extent in Delaware and Chesapeake Bays also, and along the Gulf Coast, particularly in Louisiana.

--From "Preparation of Eastern Oysters for Market," Fishery Leaflet 50.